

THE IRON AGE

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by David Williams, Nos. 96, 98, 100 & 102 Reade St., New York.

Vol. LIV: No. 2.

New York, Thursday, J

\$4.50 a Year, including Postage.
Single Copies, Ten Cents.

Reading Matter Contents.....page	84
Classified List of Advertisers....	91
Alphabetical Index to Advertisers	95
Advertising and Subscription Rates	91

SHULTZ BELTING CO.
MANUFACTURERS OF
IT BELTS THE EARTH
THE MOON AND MAKES
RAWHIDE BELTING
TANNED SURFACES
ONLY.
INTERIOR
RAWHIDE
NONE
GENUINE
WITHOUT
"SABLE"
STAMPED EVERY
TEN FEET

Send for circular "I" to
SHULTZ BELTING CO.
ST. LOUIS, MO.
NEW YORK, N.Y., 113 Liberty St., A. B. Laurence, Mgr.
BOSTON, MASS., 164 Summer St., G. J. Kelley, Mgr.
PHILADELPHIA, PA., 129 N. 3d St. J. Garnett, Mgr.

TUDOR IRON WORKS,
ST. LOUIS.
Manufacturers of
**HARROW TEETH, MINING RAILS,
SPIKES,
TRACK FASTENINGS.**

Great Reduction in Prices of Bristol's Patent
**STEEL BELT
LACING.**

Send for show
card, circular
and free samples.
READY TO APPLY FINISHED JOINT

THE BRISTOL CO., - Waterbury, Conn.
New York Office, 121 Liberty St.

BRAIDED CORD.

Samson and Massachusetts Brands.
Send for Samples.

SAMSON CORDAGE WORKS, Boston, Mass.

TURNBUCKLES.

BRANCH OFFICE: 136 Liberty St., New York.
Cleveland City Forge and Iron Co., - Cleveland, O.

The Williams

Printing Co.,

Commercial Printers,

and Binders.

Estimates Furnished for all Classes of Work.

96-102 Reade St. - New York.

U. M. C.
NITRO NITRO NITRO NITRO
CLUB CLUB CLUB CLUB
SHELL SHELL SHELL SHELL
—(SALMON COLOR)—

is designed to meet the demand for a moderate priced shell adapted to Nitro Powders. Gives quick ignition and strong combustion.

TRY THE

"Trap," "Smokeless," "Walsrode," "Black Club,"
"New Club," and "Nitro Club" U. M. C. Shells.

The Union Metallic Cartridge Co.,
BRIDGEPORT, CONN.

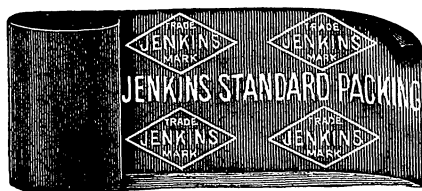
RANDOLPH & CLOWES,

WATERBURY, - CONN.

Western Depot, 71 West Washington St., Chicago, Ill.

Branch Offices: { 104 John St., New York.
Room 320 Phila. Bank Bldg., Phila., Pa.
99 Milk St., Boston, Mass.
Room 208 Neave Building, Cincinnati, O.

SEAMLESS DRAWN BRASS AND COPPER TUBING.
Hot and Cold Rolled Sheet Copper and Brass of all kinds.



JENKINS' STANDARD PACKING

For Steam or Joint Packing has no superior. It is manufactured in all thicknesses. It is not loaded to increase weight. Does not ROT or BURN OUT. Every sheet is stamped with Trade-Mark, like cut.

JENKINS BROS.,

New York, Philadelphia, Boston and Chicago.

It Pays to Handle "COPPERIZED" Oilers. &c.,
Stamped Seamless from the Wilmot & Hobbs Mfg. Co.'s Celebrated Cold Rolled "SWEDOH" Steel,
BECAUSE:

FIRST. They are all perfect in construction and finish both inside and outside, are exceedingly durable, work perfectly, do not come back because of defects, but stay sold once and for all and sell at sight because of their beauty and very substantial construction.

SECOND. The manufacturers make the goods principally to illustrate how their celebrated Cold Rolled "SWEDOH" Steel can be stamped, drawn and plated, and in consequence of this excellent advertisement and their unequalled facilities for their manufacture, are enabled to offer a wonderfully large and fine line of goods at a very low price.

THIRD. The Oilers are also thoroughly advertised and the manufacturers refer purchasers to those dealers who carry a stock and they do not solicit trade from consumers, but carry out a broad minded policy in all their dealings. They carry at all times an immense stock of all the numerous sizes and all orders promptly. All houses ordering a stock of \$100 to \$200 worth assorted sizes will be furnished free 3,000 small envelope size catalogues or price-lists "C." Illustrating some two dozen sizes of Oilers, &c., printed in copper, bronze and nickel and the jobber's name and address will also be printed in bronze. Have you seen the salesman's dissected samples of No. 13 size?

BEWARE OF CHEAP AND INFERIOR IMITATIONS of our "COPPERIZED" OILERS, &c., or any goods infringing our Trade-Marks or Patents. AS WE SHALL PROTECT OUR INTERESTS TO THE FULL EXTENT OF THE LAW. ONE HUNDRED DOLLARS REWARD offered for any information which results in our convicting parties so infringing. THE WILMOT & HOBBS MFG. CO., Main Office, Mills and Factories at Bridgeport, Ct.

STORE, 24 MURRAY ST., NEW YORK.

Rainey Connellsville Furnace and Foundry Coke.

The only Coke you can buy and know you are getting the best that can be manufactured. All our works in the heart of the Region, within four miles of Connellsville, Pa.

CAPACITY 4,000 TONS DAILY.

W. J. RAINEY,

MAIN OFFICE:

Mercantile Bank Building.

CLEVELAND, OHIO.

THE
ANSONIA BRASS
AND **COPPER CO.**
MANUFACTURERS OF
BRASS AND COPPER
Seamless Tubes, Sheets, Rods and Wire.

Ingot Copper.

SOLE MANUFACTURERS

Tobin Bronze

(TRADE-MARK.)

Condenser Plates, Pump Linings, Wire, Round,
Square and Hexagon Bars, for Pump
Piston Rods and Bolt Forgings.

19 & 21 Cliff Street, - - New York.

THE
New Haven Copper Co.,
SOLE MAKERS OF

POLISHED COPPER

Under Patent of T. James, Sept. 12, 1876.

ALSO MANUFACTURERS AND

DEALERS IN

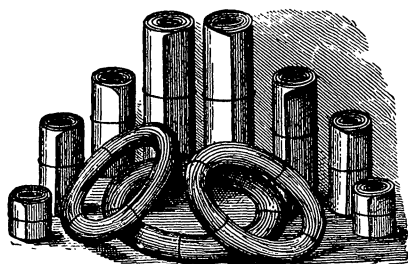
BRAZIERS' & SHEATHING COPPER,

Kettles, Bottoms, Bolts, Circles, &c.,

ALSO MANUFACTURERS OF

Cast Steel Augers and Bits of Superior Quality.

294 Pearl St., NEW YORK.



Waterbury Brass Co.

Established 1845.

Sheet, Roll and Platers' Brass,

German Silver, Copper, Brass and Ger-
man Silver Wire, Brass and
Copper Tubing.

**COPPER RIVETS AND BURS
PERCUSSION CAPS,
TAPE MEASURES,**

METALLIC EYELETS,

Brass Kettles, Brass Tags, Powder Flasks,
Shot Pouches, &c.,

AND SMALL BRASS WARES OF EVERY DESCRIPTION.
HICK'S PRIMERS. BERDAN PRIMERS.

*Cartridge Metal in Sheets or
Shells a Specialty.*

Sole Agents for the CAPEWELL MFG. CO.'S
Line of Sporting Goods.

DEPOTS:

296 Broadway, New York. 125 Eddy St., Provid-
ence, R. I. 38 Mechanic St., Newark, N. J.
MILLS AT WATERBURY, CONN.

WHEN IN WANT OF
ANYTHING IN

**BRASS
AND
COPPER**

WRITE

ROME BRASS & COPPER CO.,
ROME, N. Y.

MATTHIESSEN & HEGELER ZINC CO.,

LA SALLE, ILLINOIS,

SMELTERS OF SPELTER

AND MANUFACTURERS OF

SHEET ZINC AND SULPHURIC ACID.

Special Sizes of Zinc cut to order. Rolled Battery Plates.

Selected Plates for Etchers' and Lithographers' use.

Selected Sheets for Paper and Card Makers' use.

Stove and Washboard Blanks.

ZINCS FOR LECLANCHE BATTERY.

BRASS GOODS MFG. CO.,

Mfrs. of Stamped Brass, Silver and Nicked Goods, Brass Labels for Cans and Rubber Moulds,

BRONZE DOOR KNOBS

Bronze and Plated Roses, Combined Rose and Escutcheon Plates, Socket Shells, &c., Patent Mirror Pin
Cushion Business Cards, Mucilage Brushes. Novelties of new design made to order.

SALESROOM: 88 Chambers St., New York. FACTORY: 86-92 Third St., So. Brooklyn.

BOOKS. YOU CAN OBTAIN PROMPTLY the latest
work on any subject in which you are
interested by addressing DAVID WILL
IAMS, Publisher and Bookseller, 96-102 Reade Street, New York.

HENDRICKS BROTHERS,

Proprietors of the

Belleville Copper Rolling Mills,

Manufacturers of

Braziers', Bolt and Sheathing

COPPER.

COPPER WIRE AND RIVETS.

Importers and Dealers in

Ingot Copper, Block Tin, Spelter, Lead, Antimony, etc.
49 CLIFF ST., NEW YORK.

THE PLUME & ATWOOD MFG. CO.

MANUFACTURERS OF

Sheet and Roll Brass

—AND—

WIRE,

GERMAN SILVER AND GILDING METAL,
COPPER RIVETS AND BURS, COP-
PER ELECTRICAL WIRE,

Pins, Brass Butt Hinges, Jack Chain,
Kerosene Burners, Lamp
Trimnings, &c.

18 MURRAY ST., NEW YORK.

71 PEARL ST., BOSTON.

90 MARKET ST., CHICAGO.

ROLLING MILL,
THOMASTON, CONN.

FACTORIES:
WATERBURY, CONN.

SCOVILL MFG. COMPANY,

Manufacturers of

BRASS

Sheet, Wire, Tubes.

**BUTT HINGES,
BUTTONS,**

LAMP GOODS,

NOVELTIES.

PURE ALUMINUM

INGOT and SHEETS.

FACTORIES, WATERBURY, CONN.

DEPOTS:

428 Broome Street, New York.

210 Lake Street, Chicago.

29 High Street, Boston.

JOHN DAVOL & SONS,

AGENTS FOR

Brooklyn Brass & Copper Co.,

DEALERS IN

**COPPER, TIN, SPELTER,
LEAD, ANTIMONY.**

100 John Street, - New York.

WILLIAM S. FEARING.

100 Chambers St., NEW YORK,

SELLS TO THE TRADE

*Sheet Brass, Fancy Sheet Brass,
German Silver, Copper, Brass
and German Silver Wire,
Braze and Seamless Brass and
Copper Tubes, Brass and Cop-
per Rods, Brass Ferrules,
Pure Copper Wire,
Sheet and Ingot Copper, Spelter,
Tin, Antimony, Lead, &c.*

MISSOURI

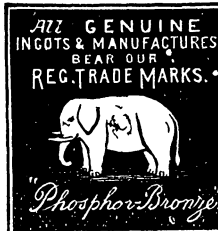
METAL COMPANY,

923 Security Building,

ST. LOUIS.

SPELTER.

**ELEPHANT
BRAND**



PHOSPHOR-BRONZE
INGOTS, CASTINGS, WIRE, SHEET &C.
THE PHOSPHOR BRONZE SMELTING CO. LIMITED
2200 WASHINGTON AVE. PHILADELPHIA, PA.
ORIGINAL MANUFACTURERS OF PHOSPHOR-BRONZE IN THE UNITED STATES AND SOLE MAKERS OF "ELEPHANT BRAND" PHOSPHOR-BRONZE.

**PHOSPHOR
BRONZE.**

Parsons' Manganese Bronze and White Brass.

MADE IN THE UNITED STATES EXCLUSIVELY BY

**THE WILLIAM CRAMP & SONS SHIP and ENGINE BUILDING CO.,
PHILADELPHIA, PA.**

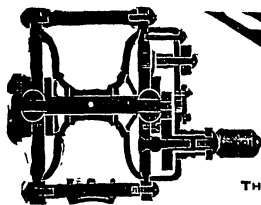
MANGANESE BRONZE PROPELLERS

—ARE USED BY THE—

Cunard, Pacific Mail, Hamburg American, White Star, International, Morgan, Canadian Pacific, North German Lloyds and many other Steam Ship Companies, and principal Naval Powers.

Parsons' White Brass; the Most Approved Anti-Friction Metal.

G. DOUGLAS PETRIE, Agent, - Nos. 39 & 41 Cortlandt Street, New York.



Solicits Correspondence about
Fishing Reels for 15 Cents to 20 Dollars each.
Brass Bird Cages " 50 " " 12 " "
Japanned " " 25 " " 10 " "
Standard Bronze, Brass and Steel Chain.
Standard Wire Picture Cord.

THE ANDREW B. HENDRYX CO., NEW HAVEN, CONN., U. S. A.



THE F. L. GAYLORD CO.,

—MANUFACTURERS—

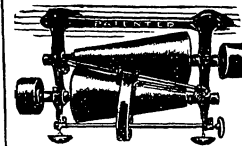
Aluminum Bronze Castings, Aluminum Bronze Sheets, Aluminum Bronze Ingots and Pure Aluminum Castings.

Box 1147, Ansonia, Conn.

Steel and Iron.

Comprising the practice and theory of the several methods pursued in their manufacture, and of their treatment in the rolling mill, the forge and the foundry. By W. H. GREENWOOD, \$2.00. Sent, postpaid, on receipt of price by DAVID WILLIAMS, Bookseller and Publisher, 98-102 Reade Street, New York.

EVANS FRICTION CONES.



For regulating the speed of machines automatically or by hand. Thousands of sets in operation driving all kinds of machinery which require from 1 to 50 H. P. Address Evans Friction Cone Co., 85 Water Street, Boston, Mass.

THE CRESCENT TRY IT! AND YOU WILL USE NO OTHER

THE CRESCENT BRAND PHOSPHOR TIN.

THE HIGHEST AND RICHEST GRADE MADE

MANUFACTURED ONLY BY THE CRESCENT PHOSPHORIZED METAL CO. OFFICE AND WORKS 2107 2109 AND 2111 INDIANA AV PHILADELPHIA, PA.

CROWN SMELTING COMPANY,

Chester, Pa.

Bronze, Brass and Composition Castings.

Inventors and Sole Manufacturers of

"Crown Bronze" Bearing Metal and "Crown ROLLING MILL Babbitt Metal."

Manufacturers of PHOSPHOR-BRONZE TO PENNSYLVANIA RAILROAD.

Specifications in Ingot metal or castings.

The W. W. & R. M. KEYS CO.,

Bronze, Composition and Brass Castings of all kinds, also Babbitt Metals.

BRIDGEPORT, CONN.



Guaranteed Best Anti-Friction Metal for all machinery bearings. For high speed and heavy crushing weight it has no equal. It is used on bearings where no other known metal will stand.
Theo. Hiertz & Son, Sole Mfrs.,
30th St. and Park Ave., St. Louis, Mo.
Mfr. Babbitt Metals, Solder, Lead Car Seals, etc.

Boston Casting Co., 122 W First St., So. Boston, Mass.
MANUFACTURERS OF
WROUGHT IRON CASTINGS.

We make sound, soft Wrought Iron Castings with a tensile strength of 60,000 to 70,000 pounds per square inch and guarantee the same to be expressly adapted for mechanical and electrical work. The castings will be true to pattern with a shrinkage of one quarter of an inch to the foot. This company is in no way connected with any other.

PHOSPHOR-TIN

BY USING MY PHOSPHOR-TIN MANUFACTURERS CAN MAKE ANY DESIRED GRADE PHOSPHOR BRONZE THEMSELVES BY THE SIMPLE PROCESS OF MELTING. MUCH CHEAPER THAN THEY ARE NOW TO BE HAD IN THE MARKET-NEW OR OLD COPPER CAN BE USED. FOR CIRCULARS AND PRICE ADDRESS HALK & NAUMANN, NEW YORK. SOLE AGENTS FOR THE U.S. AND CANADA.

The American Metal Co.

(LIMITED),

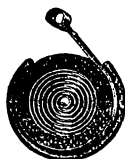
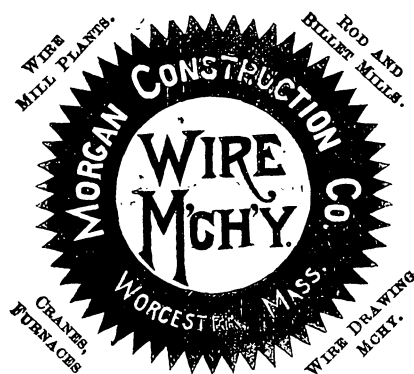
Levin Building, 80 Wall St., New York.
P. O. BOX 957.

COPPER, COPPER ORES AND MATTES.
TIN, LEAD, SPELTER, ANTIMONY, NICKEL,
ALUMINUM, BULLION, IRON.

Advances made on Consignments

AGENTS FOR

Henry R. Merton & Co., - - London.
Metallgesellschaft, Frankfurt-on-Main.
Williams, Foster & Co., Ltd, Swansea.

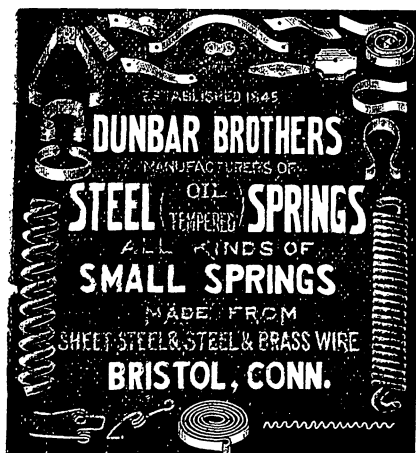
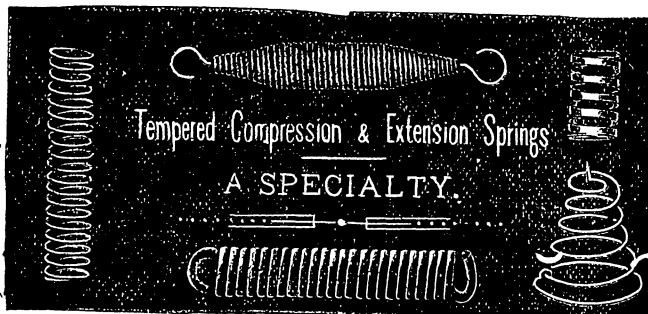
WASHBURN & MOEN MANUFACTURING CO.,**WORKS IN WORCESTER, MASS., and WAUKEGAN, ILL.****MAKERS OF IRON, STEEL AND COPPER****EVERY VARIETY OF W I R E FOR ALL PURPOSES.****FINE OIL TEMPERED SPRINGS A SPECIALTY.****SPIRAL****FURNITURE,
BED AND
SPECIAL
SPRINGS.****FLAT****CLOCK
and
WATCH
SPRINGS.****EXPORT ORDERS PROMPTLY FILLED.****Warehouses: 16 Cliff and 241 Pearl Sts., New York; 107 & 109 Lake St., Chicago; 8 & 10 Pine St., San Francisco.**

WM. MCFARLAND,
IRON FOUNDER,
TRENTON, - - N. J.
Chilled Cast Wire DIES
A SPECIALTY.
Any Size or Style Made at Short Notice.



J. F. KAY,
PASSAIC, N. J.
MACHINERY FOR MAKING OF
WIRE STRAND AND ROPE.
Winding, Stranding and Closing Machines, &c. Electric Wire and Cable Machinery. Hemp Rope and Cordage Machinery.
Plans and Estimates.

MILLER & VAN WINKLE,
MANUFACTURERS OF
STEEL WIRE AND STEEL SPRINGS.

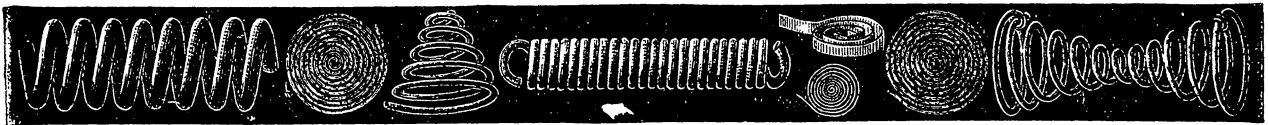
**TEMPERED STEEL WIRE.****MACHINERY SPRINGS.****OFFICE AND WORKS: } BROOKLYN, N. Y.
18 to 24 Bridge Street,****BOOKS**

THE NEWEST BOOKS ON Metal Working, Iron, Steel and Metallurgy; Mining, Mechanical and Civil Engineering; Casting and Founding; Electricity and Electric Lighting; Draftsmanship, Architecture and Building, promptly supplied on receipt of price. SEND FOR CATALOGUES, mentioning the kind of book you are looking for.
DAVID WILLIAMS, 96-102 Reade St., New York.



117th to 118th Street and Harlem River.

General Offices, Foot 118th Street, New York.



Makers of Iron, Bessemer, Siemens-Martin and Crucible Cast Steel Wire of all kinds, annealed, soft and hard drawn; Coppered Spring Wire for Furniture Springs, &c., Coppered Soft Wires, Baling Wires, Suspension Bridge and Rope Wires of all kinds, &c.

STEEL MUSIC WIRES and MUSIC SPRING WIRES,

UNRIVALED FOR PIANOFORTE STRINGS.

FOR THE HIGHEST CLASS OF SPRINGS.

Specialty of finest Cast Steel Wires, round, flat, square and any other shape, tempered and also in the soft state, guaranteed to harden and temper. Solid Rib and Paragon Umbrella Wires. Crinoline, Corset, Shade Roller, Look, Hat, Brush, Saw, Band Saw, Clock Spring, Clock Bell, Clock Verge and Watch Spring, Rule and Tape Line and Eyeglass Wires, &c. Piano, Needle, Fish Hook, Drill and Hair Spring Wires. Special Cast Steel Wires of any kind made for special purposes. Also Covered Wires—Braided and Cloth and Paper Covered—for crinoline, corset and other purposes. Cold Rolled and Silt soft and Tempered Steel Strips of all kinds and for all purposes.

Special Wires and Springs of Every Description.

CORRESPONDENCE SOLICITED.

SAMPLES FURNISHED ON APPLICATION.

THE LONGEST COIL OF STEEL EVER ROLLED OF ITS DIMENSIONS, 2% IN.

WIDE x **2250 FEET LONG** x .00425 IN. THICK.

SUPERIOR STEEL COMPANY, - Pittsburgh, Pa.

—MANUFACTURERS OF ALL DESCRIPTIONS OF—

HOT and COLD ROLLED STRIP STEEL.

In widths up to 10 inches and in thickness from .0025 to 2 inches and from ordinary hot rolled soft steel to the finest cold rolled watch mainspring steel. Fine crucible steel our specialty.

Coils Furnished up to 5000 feet long according to width and gauge ordered.

—AGENCIES:—

Ely & Williams, 38 Park Row, New York; 1239 Market St., Philadelphia, Pa.; Samuel T. Rolley, 1030 Monadnock Bld'g, Chicago.

Wire Cloth AND Wire Goods

Hardware Grade and Fanning Mill Wire Cloth, Poultry Netting, Heavy Window Screen Wire Cloth, Coal and Sand Screens, Riddles, Ash Sieves, &c., &c.



Office and Counter Railings, Elevator Enclosures, Wire Stall Guards, Hay Racks Feed Boxes, Window Guards, &c., &c.

BUFFALO, N. Y.

GEO. W. PRENTISS & CO., HOLYOKE, MASS.,

—MANUFACTURERS OF—

WIRE. WIRE.



Bright, Coppered, Annealed and Tin Plated.

Finished to order, round, square, oval or flat.

TINNED WIRE OF ALL SIZES A SPECIALTY

Handy Tables from Thurston's Steam Engine Manual. By Prof. R. H. THURSTON. For use in Laboratory Computations in Technical Schools. 8vo, cloth.....\$1.50
For Sale by David Williams, 96-102 Reade St., N. Y.

VOLUTE,
WIRE
and
FLAT STEEL

SPRINGS

for Agricultural Implements, Machinery and various other purposes. Write for prices to

SABIN MACHINE CO.,
MANUFACTURERS.
MONTPELIER, VT.

Always
Ask
For

"POWER"
ROPE.

Unequaled for Strength
and Durability.

Made Only by

Broderick & Bascom Rope Co.,
St. Louis, Mo.

**HOWSON
AND
HOWSON**

Counsellors at Law
Solicitors of Patents

PHILADELPHIA

Forrest Building, 119 S. 4th St.

NEW YORK

Potter Building, 38 Park Row.

WASHINGTON

Atlantic Building, 928 F St.

PATENTS

U. S. and Foreign Secured.

Trade Marks and Copy Rights. Twenty Years' Experience. Send model or sketch and brief description of your invention for Free report as to patentability. Expert searches and opinions as to Scope, Validity and Infringement. Patent Causes Prosecuted and Defended. Practice in U. S. Supreme, Circuit and Circuit Appeals Courts, and U. S. Patent Office.

Send for "Plain Words about Patents," Free.

PATENT PRACTICE EXCLUSIVELY.

References Furnished on Application.

H. B. STOCKING, Attorney at Law,
611 F ST., N. W., WASHINGTON, D. C.

CHARLES N. BUTLER, C.E.

ATTORNEY IN PATENT CASES

611 Mutual Life Building,
Tenth and Chestnut Sts., PHILADELPHIA, PA.

Formerly of the Examining Corps,
U. S. Patent Office.

PATENTS.

H. W. T. JENNER, Patent Attorney and Mechanical Expert, 519 Seventh St., Washington, D.C. Charges moderate. Write for terms. Established 1883.

W. S. ESTEY,

No. 65 FULTON ST., NEW YORK,

MANUFACTURER OF

WIRE CLOTH

Of Brass, Copper, Iron, Galvanized and Steel Wire of all meshes and grades. For Mining, Milling and all other purposes. Locomotive Spark Wire Cloth, &c.,

—AND—

WIRE WORK

For Bank, Office and Counter Railing, Store Fronts, Window Guards, &c.

Galvanized Twist Netting.

Oliver's Patent Decoy Rat Traps.

S T Pat. Adjustable Foundry Riddles.

S T SAND SCREENS.

SEND FOR CATALOGUE.

PHILLIPS, TOWNSEND & CO.,

North Penn Junction, Philadelphia.

WIRE NAILS, - - -

- - NORWAY RIVETS.

Rivets marked "P" are not of our make. We make only first-class NORWAY IRON RIVETS.

A. LESCHEN & SONS' ROPE CO.,

MANUFACTURERS OF

Trade-Mark.

HERCULES
WIRE ROPE.

Registered.

ST. LOUIS, MO.

CORRESPONDENCE INVITED.

WIRE ROPE
HAZARD MFG CO.

WAREHOUSES: 87 Liberty St., New York.

WORKS:

Wilkesbarre, Pa.

NEW HAVEN WIRE MFG. CO.,

Manufacturers of

WIRE

in great variety

NEW HAVEN,

CONN.

Represented in New York by HENRY B. NEWHALL CO., 105 Chambers St.

CALIFORNIA WIRE WORKS,

509-511 Market St.,

San Francisco, Cal.



MANUFACTURERS OF

WIRE ROPE FOR CABLE RAILWAYS AND MINING PURPOSES.

HALLIDIE'S PATENT WIRE ROPEWAY,

Simplest and most economical means of transportation. Send for Illustrated Catalogue.

SPRINGS—RIVETS.

Specialties in

SHEET METAL WORK,

CLOCK and INDICATOR POINTERS,

CLARK & COWLES, Plainville, Ct.

THE

WIRE GOODS COMPANY.

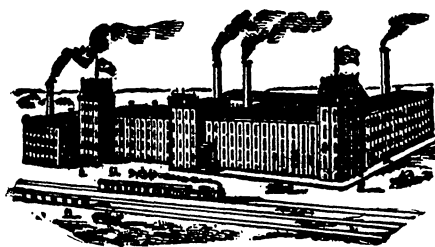
Worcester, Mass.

Hardware and Kitchen Wire Goods. Specialties to order. Everything in Wire.

HOWARD & MORSE
45 FULTON ST.,
NEW YORK.
HEAVY MINING
COPPER.
BRASS,
STEEL
OR IRON
WIRE CLOTH.

ALSO
 MANUFACTURERS OF
GENERAL
WIRE WORK.
 Window Guards,
 Stable Fixtures,
 RAILINGS,
 Sand Screens
 Coal Screens
 Etc.

WICKWIRE BROTHERS, CORTLAND, N. Y.
 MANUFACTURERS OF
 Wire Cloth and Wire Goods,



Coal Sieves,
 Flour Sieves,
 Corn Poppers,
 Dish Covers,
 Metallic
 Coal Sieves.

NEW PROCESS
Cortland
POWER LOOM
WIRE CLOTH.

Every roll wrapped in Pink
 Paper and has our name on
 label.

Kilmer Manufacturing Co.

—Newburgh, N. Y.

Manufacturers of

BALE TIES

For Baling
 Hay, Straw,
 Rags,
 Excelsior, &c.

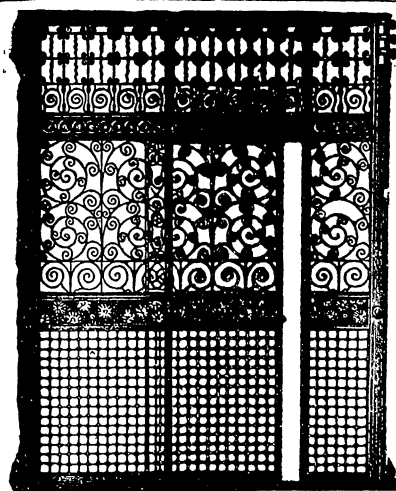
ALSO WIRE RODS, BARB WIRE, COILED STEEL WIRE, WIRE STAPLES, GALVANIZED WIRE, ORNAMENTAL FENCING, &c., &c.

Western Warehouse, 543 and 545 State Street, Chicago, Ill.

Western Office, 21 Quincy Street, Chicago, Ill.

New York Office, 111 Water Street, New York City.

Works and General Office, Newburgh, N. Y.



Elevator Enclosures.

Brass Wire and Iron Railings in plain or fancy designs.

Wire and Wrought Iron Fences and Window Guards.

WRITE FOR CATALOGUE.

LUDLOW-SAYLOR WIRE CO.,

114 & 116 South 4th St., St. Louis, Mo.

THE VAN DORN IRON WORKS CO., Cleveland, Ohio.



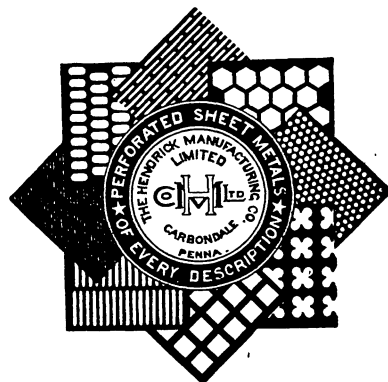
Office and Salesroom, 157 1/2 Euclid Ave.,
 MANUFACTURERS OF

WROUGHT IRON FENCE and RAILING.

Stable Fixtures, Crestings, Terminals, Wire Office and Counter Railing, Lawn Seats and Vases.

Iron and Steel Jail Cell Work. Ornamental and Structural Ironwork.

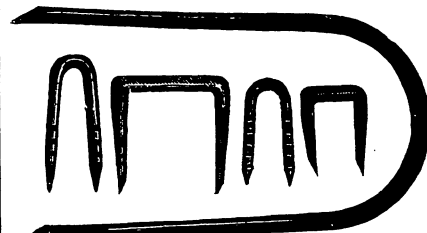
PERFORATED SHEET METALS
 OF EVERY DESCRIPTION.



THE HENDRICK MFG. CO., LTD.,
 CARBONDALE, PA.

E. H. Titchener & Co.,
 BINGHAMTON, N. Y.

—MANUFACTURERS OF—



STAPLES in All Varieties,
 Double-Pointed Tacks, Bed Links, Etc.

New York City Agents, **HARMON & DIXON,**
 118 Chambers Street.

Quick Shipment. Write for Prices.

BARBED
 PLAIN
 CABLE

WIRE

NAILS
 STAPLES
 STRETCHERS

INDIANA WIRE FENCE CO.,

Crawfordsville, Ind.

CHAMPION IRON
COMPANY.



The largest Iron Fence and Railing Works in the U. S.
KENTON, OHIO.

COBB & DREW,
 PLYMOUTH, MASS.

Manufacturers of Norway Iron Rivets, Brass and Copper Rivets, Burrs, Washers, D. P. Tacks and Staples.

New York Agency, **James S. Henderson,** successor to Disosway & Henderson, Hardware.

Agents for Philadelphia Star Carriage and Tire Bolts.

CLINTON WIRE CLOTH CO.,

— Manufacturers of Every Description of —

WIRE CLOTH, HEX. NETTINGS, WIRE LATH AND FENCING.

Perforated Metals. GALVANIZERS AND TINNERS OF **Wire Cloth and Nettings.**

Clinton "Standard" (Number 33 Wire) Painted Window Screen Wire Cloth.

FACTORY AND GENERAL OFFICE: CLINTON, MASS.

NEW YORK, 76 Beekman Street.

BOSTON, 199 Washington Street.

CHICAGO, 137 Lake Street.

The Gilbert & Bennett Mfg. Co.

— MANUFACTURE —

WIRE CLOTH, NETTING,

Fencing, Gates, Fencing Tools,

Wire Goods, Wire Work

Stable Fixtures, Railings, Window Guards.

WIRE LATHING WITH HAMMOND'S METAL FURRING.

44 Cliff Street,
NEW YORK.

148 Lake Street,
CHICAGO.

Factories, { GEORGETOWN, CONN.
CHICAGO, ILLINOIS.

ESTABLISHED 1818.

Pearl Window Screen Wire Cloth.
Galvanized Steel Wire Cloth.
Galvanized Wire Poultry Netting.
"Cottage" Lawn & Garden Fencing.
"C. & B." Web Wire Fencing.
Sieves, Riddles, Screens.
Gilbert's Rival Ash Sifters.
House Furnishing Wire Goods.

WRIGHT & COLTON WIRE CLOTH CO., Worcester, Mass.



NEW PROCESS **HARD STEEL WIRE CLOTH AND NETTING**
GALVANIZED

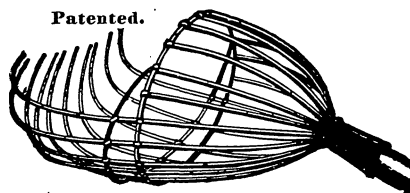
WIRE NETTING. Painted Window Screen Wire Cloth,
WIRE LATHING, HOUSE FURNISHING WIRE GOODS.

Patented March, 1884.
Patents Pending.

MANUFACTURERS OF EVERY DESCRIPTION OF

SEND FOR LATEST CATALOGUE.

"PENNSYLVANIA" FRUIT PICKER.



This Cut almost speaks for itself—the device being so much like the human hand shows at once the utility of the article.

AS A FRUIT PICKER IT HAS NO SUPERIOR.

It is made of Heavy Galvanized Wire, and Easily Adjusted to a Pole. It has been sold for several years, and the demand (as it is becoming known) is steadily increasing. The difficulty of detaching fruit and securing it unbruised is apparent to everyone so engaged. This overcomes the difficulty, and saves the finest fruit, which commands the highest prices.

THE LOW PRICE AT WHICH IT IS SOLD

brings it within the reach of those who have but little fruit to gather as well as those who have large quantities. Price, per dozen, \$6.00. Liberal discount to dealers. It will gather Apples, Peaches, Pears, etc.

Manufactured by **Pennsylvania Wire Works,**

EDWARD DARBY & SONS, 233 & 235 Arch St., Philadelphia Pa.

PAINTED AND GALVANIZED WINDOW SCREEN CLOTH.

IRON, STEEL, BRASS AND COPPER WIRE CLOTH.

MANUFACTURERS
**THE ROEBLING
STANDARD
WIRE
LATHING.**

**NEW JERSEY
WIRE CLOTH CO.**

**"JERSEY"
POULTRY
NETTING
AND FARM
FENCING.**

NEW JERSEY. 117 and 119 LIBERTY STREET.

NEW YORK.

CHICAGO. 171 and 173 LAKE STREET.

SAN FRANCISCO. 25 and 27 FREMONT STREET.

METAL PLATE WORK. Its Patterns and Their Geometry.

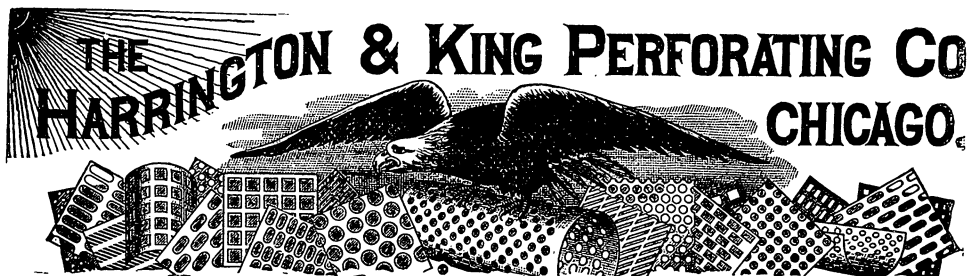
Also notes on metals and rules in mensuration for the use of tin, iron and zinc plate workers, &c.

By C. T. MILLIS. Second edition, revised and enlarged. 377 pages, 314 illustrations.

12mo, Cloth. . . . \$3.50.

Sent, postpaid, upon receipt of price by **DAVID WILLIAMS, Publisher and Bookseller, 96-102 Reade St. N. Y.**

Perforated Filter
Press Plates.



Bronze Screen Plates
To withstand action of
acidulated waters.

PERFORATORS OF STEEL, IRON, COPPER, ZINC, BRASS AND TIN.

GRAIN CLEANING AND MINING MACHINERY,
WOOLEN, COTTON, PAPER AND PULP MILLS,
RICE, FLOUR AND COTTON SEED OIL MILLS,
SUGAR AND MALT HOUSES,
DISTILLERIES, FILTER PRESSES,

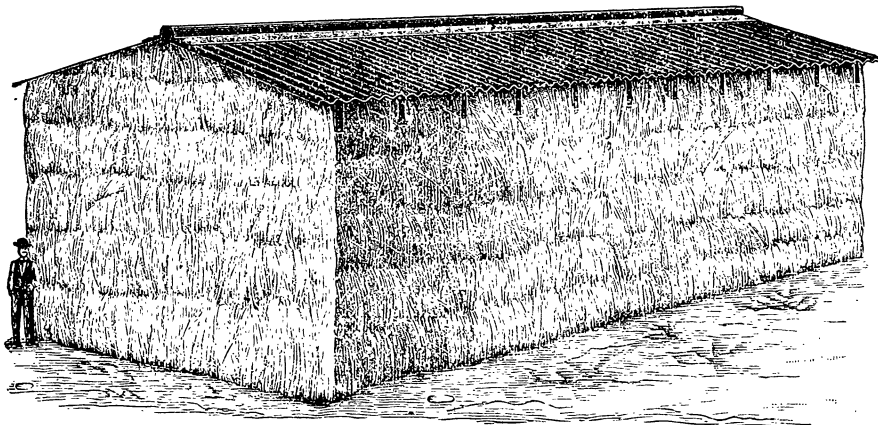
FOR USE IN

STONE, COAL AND ORE SCREENS,
BRICK AND TILE WORKS, FILTERS,
SPARK ARRESTERS, GAS AND WATER WORKS,
OIL, GAS AND VAPOR STOVES,
COFFEE MACHINERY, ETC., ETC.

STANDARD SIZES PERFORATED TIN AND BRASS ALWAYS IN STOCK.

Main Office and Works, 222 to 240 N. Union St., Chicago, Ill., U. S. A. Eastern Office, No. 284 Pearl St., New York.

© HAY RICK COVERING. ©



(Made of Cor. Sheet Metal.)

Illustrating but one of the many uses to which this product is adapted. Any one can apply it, requires no special skill. Its cheapness and infinite variety of purposes for which it can be employed is what commends it to the thinking mind. Our specialty is.

“Roofing”

The Cincinnati
Corrugating Co.,
Box 312, Piqua, O.

Fourth Edition, carefully revised and partly re-written, in one thick volume, Medium 8vo, 420 pages with Illustrations, price \$6 00, strongly bound for office use.

THE WORKS MANAGER'S HANDBOOK

OF

MODERN RULES, TABLES AND DATA

For Civil and Mechanical Engineers, Millwrights and Boiler Makers;
Tool Makers, Machinists and Metal Workers; Iron
and Brass Founders, etc., etc.

BY

WALTER S. HUTTON,

CIVIL AND MECHANICAL ENGINEER.

The Author having been in the habit of compiling Rules and Data for his own use in the construction of a great variety of modern Engineering Work, and having found his notes extremely useful, decided to publish them, after revising them to date, believing that a practical work, suited to the Daily Requirements of Modern Engineers, would be favorably received by the public.

The rapid sale of the previous Editions, and the continued favor the Work has received, show that it has been of considerable service to Engineers.

In issuing a Fourth Edition, many alterations and improvements have been made, including the following amongst other additions, viz. : New matter relating to Steam Engines—Gas Engines—Pumps—Water Supply, etc., etc.

Any book published sent, postpaid, on receipt of price by

DAVID WILLIAMS, Publisher and Bookseller, 96-102 Reade St., New York.

ATLAS TACK CORPORATION.**508 SEARS BUILDING, BOSTON, MASS., U. S. A.**

BRANCHES: **DUNBAR, HOBART & CO., WHITMAN, MASS.** ESTABLISHED IN 1810. **CONSOLIDATED 1891.** **LORING & PARKS, PLYMOUTH, MASS.** ESTABLISHED IN 1842.
A. FIELD & SONS, TAUNTON, MASS. ESTABLISHED IN 1827. **TAUNTON TACK CO., TAUNTON, MASS.** ESTABLISHED IN 1864.
AMERICAN TACK CO., FAIRHAVEN, MASS. ESTABLISHED IN 1867. **OLD COLONY RIVET CO., PLYMOUTH, MASS.** ESTABLISHED IN 1866.

MANUFACTURERS OF

Tacks, Brads, Small Nails, Shoe Nails, Lining and Saddle Nails, Tufting Nails and Buttons, Wire Nails, Finishing Nails, Patent Brads, Hungarian Nails, Steel Shanks for Boots and Shoes, Wire Tacks, Escutcheon Pins, Eyelets, Glaziers' Points, Rivets, Burrs, Furniture Springs, Pilgrim Spring Bed, and other articles.

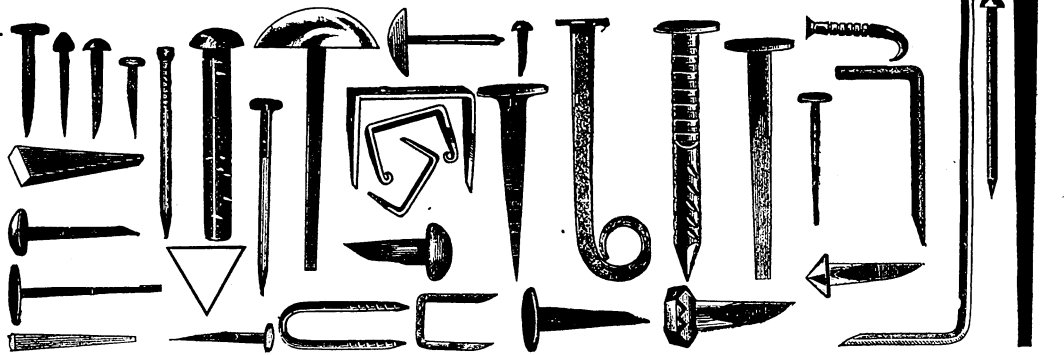
We have the largest and only complete and fully assorted stock in the world. Our manufacturing facilities are unequalled. The foregoing well known brands we continue to use, and either will be furnished upon request. We have long distance telephone connection with our New York Store and our factories.

MAIN OFFICE 508 SEARS BUILDING, 199 WASHINGTON ST., BOSTON, MASS.**BRANCH OFFICE & WAREHOUSE, 81 WARREN ST., NEW YORK.****BRANCH OFFICE & WAREHOUSE, 939 & 941 LAKE ST., CHICAGO, ILL.****BRANCH OFFICE & WAREHOUSE, 408 MARKET ST., SAN FRANCISCO, CAL.****BRANCH OFFICE & WAREHOUSE, 406 COMMERCE ST., PHILADELPHIA, PA.****BRANCH OFFICE & WAREHOUSE, 14 WEST GERMAN ST., BALTIMORE, MD.****GRAND CROSSING TACK CO.,****GRAND CROSSING, CHICAGO, ILL., U. S. A.**

Tacks and Small Nails, Wire Nails and Brads, Double Pointed Tacks and Staples, Lining and Saddle Nails, Slating and Roofing Nails, Brass and Iron Shoe Nails and Specialties.

NOVELTY 5c. SELLERS.**CHAMPION WOOD KEYS.****CLAW HANDLES.**
NIGALBY STEELE.**TACKS.** **FT. DEARBORN.**
(Gal. ps.)
BONNIE BLUE.**NAILS.** **PARISIAN GILT.**
JUST ENOUGH.
(Brass.)
DOUBLE ENOUGH.
(Iron.)**BRADS, BILL NYE BOX.**

New York Office,
34 WEST BROADWAY.

**The New York Iron Roofing and Corrugating Co.**

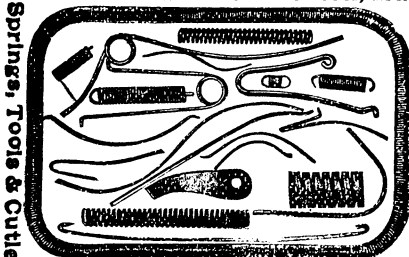
Finest and Largest Variety of Sheet Metals. Products manufactured in the U.S. **FIRST & WASHINGTON STS. JERSEY CITY, N.J.**

Corrugated, Crimped and Clap-Board Iron Roofing & Siding

Iron Buildings, Roofs, Doors, Shutters, Cornices,
Skylights, Bridges, &c.

MOSELEY IRON BRIDGE AND ROOF CO.

Office 5 Day Street, Room 13, NEW YORK.

TUCK M'F'G CO., Brockton, Mass**Tempered Springs of all kinds.**

SPECIAL WIRE TACKS and NAILS. Particular attention given to production of goods adapted to special lines of business. Duplicating samples a specialty.

Taunton Wire Nail Co.,
Taunton, Mass.

REYNOLDS & CO.

MANUFACTURERS OF

SET, CAP AND MACHINE SCREWS,

Studs, Coupling Bolts, Stove Bolts, Finished Nuts, &c.



Also Hand and Draw-plate Moulding Machines for Foundry Use.

NEW HAVEN, CONN.

SEND FOR CATALOGUE.

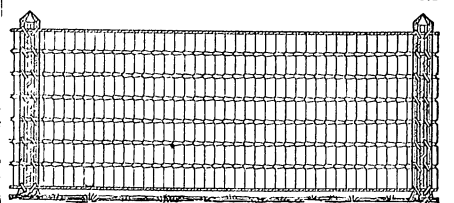
FOUNTAINS

FOUNTAIN.

For Lawns,
Parks, Etc.
All Kinds,
All Sizes,
All Prices.
Wire and Iron Work
of every description.

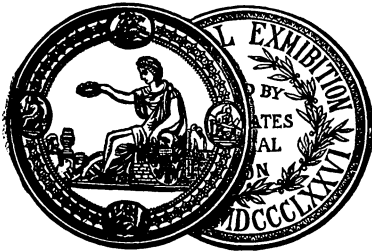
CATALOGUE FREE.

E. T. BARNUM,
Detroit, Mich.

RANDALL WOVEN WIRE FENCING.

A wire cable on each edge. Always taut. When erected every wire is properly strained, takes its permanent position and sustains every wire attached to it. There are no bulges, sags, ruffles or puckers to take out or guard against in straining. Send for circulars. Address

RANDALL FENCE CO., Le Roy, N. Y.



U. S. CENTENNIAL EXHIBITION
1876



METROPOLITAN MECHANICS INSTITUTE



UTICA MECHANICS ASSOCIATION
1856



FRANKLIN INSTITUTE
1856



AMERICAN INSTITUTE
1855



WORLD'S FAIR, N.Y.
1853



AMERICAN INSTITUTE
1841

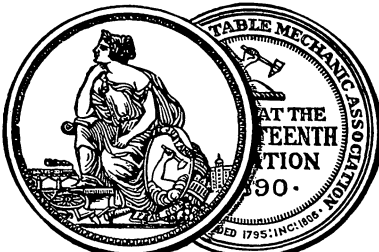
ESTABLISHED 1838.

American Screw Company, Providence, Rhode Island, Has Received an Award at the World's Columbian Exposition

For Wood and Machine Screws,
Bolts and Rivets.



AMERICAN INSTITUTE
1891



MASS. CHARITABLE MECHANIC ASS'N
1890



EXPOSITION UNIVERSELLE
PARIS, 1889



MIDDLESEX MECHANIC ASSOCIATION
1864



HARTFORD CO. AGRICULTURAL SOCIETY
1842



FRANKLIN INSTITUTE
1842



MASS. CHARITABLE MECHANIC ASS'N
1844



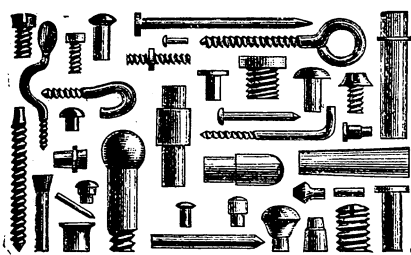
AMERICAN INSTITUTE
1847



WORCESTER CO. MECHANICS ASS'N
1849



MASS. CHARITABLE MECHANIC ASS'N
1850



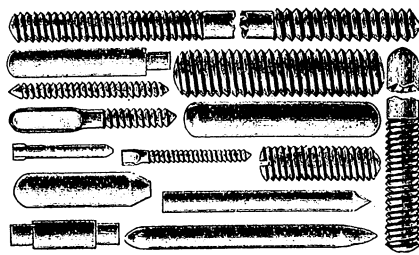
IRON and BRASS RIVETS,

STUDS, PINS, SCREWS, &c,

For Manufacturers of Light Hardware.

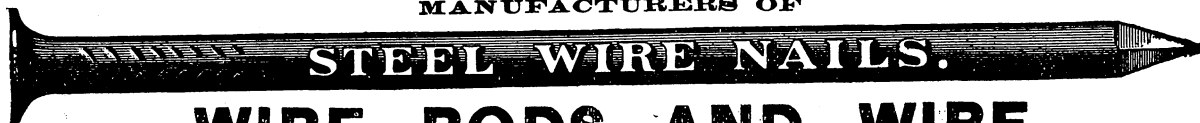
Blake & Johnson

WATERBURY, CONN.



NEW CASTLE WIRE NAIL CO.,

MANUFACTURERS OF



STEEL WIRE NAILS.

WIRE RODS AND WIRE.

Office and Works,

NEW CASTLE, PA.

THE BOND NAIL.



These nails are made from different sizes of wire with head at any desired position between the points. For coopers, box and furniture manufacturers' dowels, they are unsurpassed. Builders and repairers of all kinds will find these nails useful. We also manufacture Doweling Machines and Sets for driving these nails. Address

THE BOND NAIL CO.,

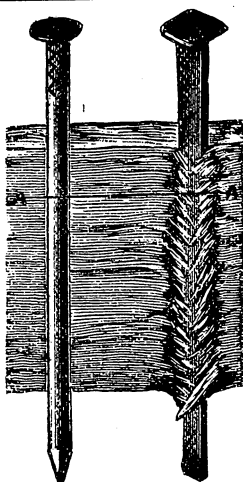
P. O. Box 23,

RAYNHAM, MASS.

BORDEN & LOVELL,

70 AND 71 WEST STREET,
NEW YORK.

Steel, Iron and Wire Nails.



THE SALEM WIRE NAIL CO.

—MANUFACTURERS OF—

STEEL WIRE NAILS, FENCE STAPLES,
ANNEALED and GALVANIZED WIRE.

Works: SALEM, O ; FINDLAY, O.

General Office: SALEM, OHIO.

BRANCH OFFICES:

Room 32, 277 Broadway, New York.

415 Phenix Bldg., Chicago.

200 Amer. Central Bld'g, St. Louis.

19-20 Ainsworth Block, Portland, Ore.

38 Pickering Bld'g, Cincinnati, O.

Osgood & Howell, 132 Market St., San Francisco, Cal.

We Give

Better Value

. . . IN . . .

Brass Shoe Nails,

As we carefully sift and assort them, so that all the dust and imperfect nails are removed.

Prices no Higher. Prompt Shipments.

CLENDENIN BROS., Baltimore, Md.

THE CELEBRATED

"SILVER FINISH"

GALVANIZED POULTRY NETTINGS.

FOR SALE BY THE HARDWARE TRADE.

GET THE BEST



FRANKLIN S. MILES,
Manufacturer of
Brass, Iron, Steel and German Silver
SCREWS,
205 Quarry St., Philadelphia.

Electric Traction on Railways and Tramways. By A. BREKENZAUN. The author has endeavored in this book to summarize as concisely as possible the present state of electric traction and to describe the various methods and constructive details which are to-day in use or which have marked consecutive steps in the development of the art. 213 illustrations, 12mo, cloth, \$4.00.

For sale by DAVID WILLIAMS, 96-102 Reade St., N.Y.

Gautier Steel Department of Cambria Iron Co.,

JOHNSTOWN, PA.

—: MANUFACTURERS OF:—

MERCHANT BAR STEEL:

Including Tire, Toe Calk, Machinery, Carriage Spring, Railroad Spring, Hoe, Rake, Fork, etc.

AGRICULTURAL STEEL AND SHAPES:

Finger Bars, Knife Backs, Rake Teeth, Bundle Carrier Teeth, Tedder Forks and Springs, Spring Harrow Teeth, Harrow (Drag) Teeth, Seat Springs, etc.

PLOW STEEL:

Flat and Finished Plow Shapes, Digger Blades, Slabs, (Penn and Pernot), Hammered Lay, Rolled Lay, etc.

COLD ROLLED STEEL SHAFTING.

STEEL HARROW DISCS.

CAMBRIA LINK BARB WIRE.


New York Office,
102 Chambers St.

Philadelphia Office,
S. W. Cor. 5th & Commerce Sts.

Chicago Office,
209 Phenix Building.

Southern Office,
Chattanooga, Tenn.

THE CAMBRIDGE IRON & STEEL CO.
MANUFACTURERS OF

GALVANIZED  **SHEET IRON**

BLACK SHEETS FOR ROOFING & CORRUGATING

PICKLED & COLD ROLLED FOR STAMPING

CAPACITY RANGES FROM NO 30
26 INCHES WIDE TO 4' 4" 40" 120"

CORRESPONDENCE SOLICITED

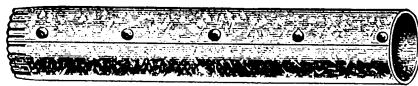
OFFICE & WORKS **CAMBRIDGE, OHIO.**

THE JERSEY CITY GALVANIZING CO., MANUFACTURERS AND JOBBERS IN Galvanized Material of Every Description.

Plain, Painted or Galvanized Corrugated Sheets.

SIDING, ROOFING, CEILING, &c., &c.

Galvanized and Plain Steel and Iron Sheets, Bars, Hoop and Band Iron, Nails, Spelter, Lead, Tin, &c.



Galvanized Riveted Leader, cheapest and best in the market. Sheet Iron Piping and Fittings of every description.

GENERAL GALVANIZING TO ORDER.

65, 67 & 69 Bay St., and 68 70, 72, 74 & 76 Morgan St., Jersey City, N. J.
Store and Office, 112 John St., opposite Cliff St., New York.

STEEL ROOFING
CORRUGATED IRON EAVE TROUGH
CONDUCTOR PIPE ROOF PAINTS ETC.

CORRESPONDENCE SOLICITED

THE CAMBRIDGE ROOFING CO. CAMBRIDGE, OHIO.

THE KANNEBERG ROOFING CO. CANTON, O.
MFRS. OF THE KANNEBERG PAT. LATEST IMPROVED FOLDED LOCK SEAM STEEL ROOFING.

ORIGINATORS OF GENUINE STEEL ROOFING.

CORRUGATED & CRIMPED IRON ROOFING
SIDING & CEILING EAVE-TROUGH
CONDUCTOR PIPE &c.

WRITE FOR CATALOGUE & PRICE LIST

ELECTRICAL BOOKS.

The Phonograph and How to Construct It. With a chapter on sound. By W. GILLET. Deals with the construction of the phonograph in such a plain manner that the student will clearly understand its construction. A complete set of drawings to scale of the various parts of the phonograph accompany the book. 87 pages, illustrated, 12mo, cloth\$2.00

Standard Tables for Electric Wiremen, with Instructions for Wiremen and Linemen. Rules for Safe Wiring, Diagrams of Circuits and Useful Formulas and Data. By CHARLES M. DAVIS. Third edition, thoroughly revised and edited by W. D. Weaver. Illustrated, 18mo, mor.\$1.00

Practical Electric Light Fitting. By F. O. ALLSOP. A treatise on the wiring and fitting-up of buildings deriving current from central station mains and the laying down of private installations. 200 pages, 12mo, cloth.\$1.50

Electrical Tables and Memoranda. By SYLVANUS P. THOMPSON and E. THOMAS. 128 pages, 2 x 2 3/4 inches, roan\$0.50

Johnston's Electrical and Street Railway Directory. Fourth Year of Publication, 8vo, cloth.\$5.00

Measurements of Electric Currents. Electrical Measuring Instruments, by JAMES SWINBURNE. Meters for Electrical Energy. By C. H. WORDINGHAM. Edited by T. COMMERFORD MARTIN. Illustrated, 1 folding plate.\$0.50

The Measurement of Electrical Currents and Other Advanced Primers of Electricity. By E. J. HOUSTON. 429 pages, 169 illustrations.\$1.50

The Electric Railway in Theory and Practice. By O. T. CROSBY and DR. LOUIS BELL. Second edition, revised and enlarged, 183 illustrations. 8vo, cloth.\$2.50

How to Use Electrical Measurement Apparatus. By CHAS. P. FREY. A Manual of Practical Information Relating to Electrical Testing. Illustrated. 8vo, paper.50c.

The Electric Transmission of Intelligence. By PROF. E. J. HOUSTON. And other Advanced Primers of Electricity. 88 illustrations. 12mo, cloth.\$1.00

Dynamos, Alternators and Transformers. By G. D. KAPP. Giving an exposition of the general principles underlying the construction of dynamo-electric apparatus without the use of high mathematics and complicated methods of investigation. 12mo, cloth.\$4.00

The Science and Practice of Lighting, as applied to sheets, open spaces and interiors. By W. H. Y. WEBBER. An elementary study. A series of articles contributed to the *Journal of Gas Lighting*. etc. 8vo, cloth.\$1.40

Experimental Electricity. By E. T. TREVERT. Numerous illustrations. New revised and enlarged edition. 12mo, cloth.\$1.00

Electric Lighting for Marine Engineers ; or How to Light a Ship by the Electric Light and How to Keep the Apparatus in Order. By SYDNEY F. WALKER. 293 pages, illustrated, 8vo, cloth ...\$2.00

The Dynamo, Its Theory, Design and Manufacture. By C. C. and F. WALLIS HAWKINS. 190 illustrations. Thick 12mo, cloth. (The Specialists' Series).\$3.00

Electrical Distribution. By M. H. KILGOUR, H. SWAN and C. H. W. BIGGS. Its Theory and Practice. 174 illustrations. 12mo, cloth.\$4.00

Portable Electricity: Being a Treatise on the Application, Methods of Construction and Management of Portable Secondary Batteries. By J. T. NIBLETT. Fully illustrated. 8vo, cloth.\$1.00

Practical Dynamo Building. By L. C. ATWOOD. With Detail Drawings and Instructions for Winding. Giving correct sizes of Wire, Dimensions of Iron, etc. etc., also Diagram for House Wiring. Illustration and Plates. 4to, cloth.\$3.00

The Dynamo, How Made and How Used. By S. R. BORTONE. Eighth edition, with additional matter and illustrations. 12mo, cloth.\$1.00

Sent, post-paid, on receipt of price, by

DAVID WILLIAMS,

Publisher and Bookseller,

96-102 Reade St., - New York.

Lukens Iron and Steel Co. INCORPORATED 1890.

The First to make Boiler Plates in America.

Chas. Huston, Pres. A. F. Huston, Vice-Prest. O. L. Huston, Genl. Mgr. Robt. B. Haines, Jr., Secy. Jos. Humpton, Treas.

STEEL AND IRON PLATES, ALSO SHEETS

TO EXTREME DIMENSIONS. WIDTHS UP TO 10 FEET. THICKNESS, No. 12 GAUGE TO 1 1/4 INCHES.

—ESTABLISHED 1810.—

WORKS: Coatesville, Pa. NEW YORK OFFICE: No. 29 Broadway. PHILADELPHIA OFFICE: 62 & 64 Bullitt Bldg.

FRANK SAMUEL,
188-186 So. 4th St.,
Philadelphia.

LOW PHOSPHOROS

PIC IRON—.03 or under.
SCRAP—.03 or .05 or under.
ORE—For O. H. and Furnace Use.
MELTING BAR—
Open Hearth and Bessemer Billets,
Skelp, Muck Bars and Scrap, Foundry and Bessemer Pig Iron.
Syracuse Tube Co.'s Tubes and Pipe.

THE PHOENIX IRON CO., 410 Walnut St., Philadelphia,

MANUFACTURE ALL THEIR PRODUCTS BOTH IN

WROUGHT IRON AND OPEN HEARTH STEEL.

Beams, Channels, Deck Beams, Angles, Tee-bars, Zee-bars and other shapes, Round, Flat and Square BARS of all sizes, Especially adapted for Bridge and Ship Builders, Fire-proof Buildings, Shafting and all Structural Purposes.
SPECIALTIES, in Wrought Iron or Steel:—Phoenix Columns and Upset Eye-Bars of all sizes,
Roof Trusses, Girders, Joists and Built-up Shapes of every description.

AGENTS:—EDWARD CORNING & CO., 29 Broadway, NEW YORK; EDWARD CORNING & CO., 70 Kilby St., BOSTON, MASS; JAMES B. STOKES, 182 Market St., SAN FRANCISCO. WESTERN OFFICE: A. C. STITES, 931 The Rookery, CHICAGO.

POTTSVILLE IRON AND STEEL CO., POTTSVILLE, PA.,

PHILADELPHIA OFFICE, 226 SOUTH 4th STREET

MANUFACTURERS OF ALL KINDS OF

STRUCTURAL IRON AND STEEL,

Viz.: I Beams, Deck Beams, Channels, Tees, Angles, Plates and Bars; and also Open Hearth Steel Billets, Blooms and Slabs.

BREWERY, MALT AND ICE HOUSE CONSTRUCTION A SPECIALTY.

Designers and Constructors of Roofs, Trusses, Columns, &c.

TESTED CHAINS.

BRADLEE & CO., - EMPIRE CHAIN WORKS,

Beach and Otis Streets, PHILADELPHIA.

Chains for Foundry Cranes and Slings, "D. B. G." Special Crane Chain. Steel and Iron Dredging, Slope and Mining Chains. Ship's Cables and Marine Railway Chains.

BARCLAY W. COTTON & CO.,
Successors to ESHERICK, COTTON & CO.,
Iron and Steel Merchants.

AGENTS FOR

"Continental" Corrugated Furnaces.
418 Walnut St., PHILA.

MIFFLIN WHEELER. G. W. NICOLLS
Nicolls, Wheeler & Co.,
FORMERLY
SITES, WHEELER & CO.,
216 South Third St., Philadelphia, Pa.
—DEALERS IN—

IRON AND STEEL SCRAP.
Pig Iron, Muck Bars, Charcoal Blooms, &c., &c.,
Steel and Iron Plates, New and Old Rails.

High Grade Tested Chains.

JAMES MCKAY & CO.,

29TH & LIBERTY STREETS,

PITTSBURGH, PA.

Manufacturers of Coil, Crane and Stud Chain. We also manufacture High Grade Steel Chain made of Basic Steel and Special Crane Chain made of U. S. Iron.

ESTABLISHED 1885—INCORPORATED 1888

CRESCENT STEEL CO.

480 PEARL ST. NEW YORK PITTSBURGH, PA. 64 & 66 S. CLINTON ST. CHICAGO.

EDWARD CORNING & CO.,

MANUFACTURERS' AGENTS AND COMMISSION MERCHANTS

BEAMS, CHANNELS,
ANGLES, TEES, PLATES,
RIVETED GIRDERS.

29 BROADWAY,
NEW YORK.

IRON AND STEEL,

421 CHESTNUT ST.,
PHILADELPHIA.

BARS, BANDS, HOOPS,
BOLTS, NUTS, RIVETS,
ROOF TRUSSES.

70 KILBY ST.,
BOSTON.

OUR OFFICES AND MILLS ARE CONNECTED BY TELEPHONES.

W. S. PILLING.

T. L. CRANE

PILLING—AND—CRANE.**IRON ORES:** Lake Superior, Foreign, Concentrates, Magnetic and native Self-fluxing.**PIG IRON:** Low Phosphorus, Open-hearth, Bessemer and other grades.**STEEL:** In Blooms, Slabs and Billets, and scrap.**COKE:** For Furnace and Foundry use.

BULLITT BUILDING, 141 S. FOURTH ST., PHILADELPHIA.

ALAN WOOD COMPANY,

MANUFACTURERS OF

Patent Planished, Galvanized, Common, Best Refined, Cleaned and Charcoal Bloom,

PLATE & SHEET IRON.

ALSO LIGHT PLATES AND SHEETS OF STEEL,

No. 519 Arch Street, Philadelphia, Pa.

Orders solicited especially for Corrugated, Gasholder, Pan and Elbow, Water Pipe, Smoke Stack, Tank and Boat Iron; Last, Stamping, Ferrule, Locomotive Headlight and Jacket Iron.

J. J. MOHR,

Bullitt Building, No. 131 South Fourth St., Philadelphia, Pa.

—SOLE AGENT FOR—

Sheridan, Temple, Brooke, Leesport, Mill Creek, Keystone, Mt. Laurel, Logan and Oley FOUNDRY, FORGE, CHARCOAL AND BESSEMER PIG IRON.

Dealer in Scrap, Old Car Wheels, Muck Bars and Connellsville Coke.

JAMES G. LINDSAY & CO.

BULLITT BUILDING, 133 South Fourth St., PHILA.

IRON and STEEL STRUCTURAL MATERIAL

For all purposes. Estimates Furnished for Iron and Steel Structures.

NEW WATER MOTOR, \$5**BOLGIANO'S LITTLE GIANT, No. 1,**

Will run your Sewing Machine, Fans and other Light Machinery.

A Week's Work

Done in a Day.

No Plumbing

Required.



SOMERVILLE, MASS., Nov. 21, 1893.
THE BOLGIANO MFG. CO., Baltimore, Md.
Gentlemen:—Your No. 1 Motor just received. I am more than pleased with it. It will do all you claim for it. I have tried it with several different kinds of light machine work. I shall always have the best word to say for this little wonder. Yours truly,
CHAS. E. PARKHURST, 79 Walnut St.

NOBLESVILLE, IND., Jan. 29, 1894.
THE BOLGIANO MFG. CO., Baltimore, Md.
Gentlemen:—The "Little Giant" Water Motor came to hand in due time, and works the sewing machine like a charm. Yours very truly,
NOBLESVILLE MILLING CO.

No. 2, \$10. Fans, Ice Cream Freezers, Lathes, Scroll Saws, Church Organs, etc.

COLORADO SPRINGS, COLORADO.

THE BOLGIANO MFG. CO., Baltimore, Md.
Gentlemen:—We received the "Little Giant" Motor No. 2 on April 28, and have tested it in every possible way, and find that it works perfectly. At present it is running an eight and twelve old style Gordon press, and takes it at a very fast rate. We are more than pleased with it, and we will recommend it to everybody as a safe investment for their money. Yours respectfully,
WOODS BROS.
NO 3. MOTOR, \$15. Coffee Mills, Washing Machines. | All Sizes of Light Fans for sale. Send for Circulars.

**BOLGIANO'S****Electric Fan Water Motor.**

CURRENT FREE,

As it Connects with any Faucet.

SAMPLE, \$6.00.

Wholesale and Retail.

NEW HOT AIR GAS IRON, \$3

Bolgiano's Perfection Gas Iron enables you to do your ironing without the use of a stove, and is in every way superior to anything of the kind ever offered the public. Gets hot in 5 minutes and costs 5 cents a day to heat.

You may send me One Dozen Perfection Gas Irons. Sold 700 charcoal Irons Expect to have more of yours.

JOHN WANAMAKER, Philadelphia, Pa.

Send for Descriptive Circulars.

THE BOLGIANO MANUFACTURING CO.,
WHOLESALE AND RETAIL,

415 WATER ST., BALTIMORE, MD.



BOLGIANO'S PERFECTION GAS IRON.
Patent applied for, 1894.

EDWARD J. ETTING,
IRON BROKER & COMMISSION MERCHANT
222 S. THIRD ST., PHILADELPHIA, PA.

Fig. Bar and Railroad Iron, Old Rails, Scrap.

AGENT FOR THE

MOUNT SAVAGE FIRE BRICK,

Eastern Penna., West New Jersey and Delaware.

Agent TRENTON IRON CO.,

For the Sale of Wire and Wire Rope.

Longdale (Va.) and other Pig Irons.

STORAGE YARD, Pier No. 57 South (old Navy Yard), which is connected with Penn. R. R. and its various connections. Negotiable Warehouse Receipts Issued. CASH ADVANCES MADE ON IRON.

ESTABLISHED 1869.

JEROME KEELEY & CO.,

The Philadelphia Bank Bldg., 421 Chestnut St., PHILADELPHIA.

Foundry & Forge Pig Irons,**Iron Ores, Coke, Coal,****Steel Blooms, Billets, Rails, etc.****Muck Bars, Blooms, Scrap Iron.**

Consulting Engineers in Metallurgy and Mining.

JUSTICE COX, JR.,

218 South 4th St., Phila., Pa.

IRON and STEEL.

—AGENT FOR—

Haldeman, Grubb & Co's.

Chickies Bessemer Pig Iron.

Mahoning Rolling Mill Co.'s

Best Quality Skelp Iron and Steel.

Pulaski Iron Co.'s

High Grade Foundry and Forge Pig Iron.

Hainsworth Steel Co.'s

Standard Bessemer Steel Billets.

Bars, Angles, Sheets, Tank and Bridge

Plates, Muck Bars, Blooms, Scrap Iron

and Tool Steel.

J. W. HOFFMAN & CO.,

Bullitt Building, 135 So. 4th St., Philad'a.

Iron and Steel Merchants.**FIG IRON,**

Iron and Steel Plates, Sheets, Bars and Shapes. Rails.

Cars and Locomotives. Track Equipment.

CORRESPONDENCE SOLICITED.

JOHN L. HOGAN & CO.,

IRON COMMISSION MERCHANTS,

Bullitt Building, 135 South Fourth St., Phila.

Agents for Brier Hill, Lehigh, Struthers**AND MUIRKIRK PIG IRON,**

Delaware Rolling Mill, muck bars. Youngstown Steel Co., Connellsville Coke.

W. H. THOMSON & CO.,

Dealers in

IRON and STEEL and**other METALS****FOR ALL PURPOSES,****Room 259, Bullitt Building,****PHILADELPHIA, PA.**

C. B. Houston. J. Max Bernard. H. H. Houston.

C. B. HOUSTON & CO.,

Bullitt Building, PHILADELPHIA.

Pig Iron, Coal, Coke, Steel Rails, Structural

Iron, Steel Castings and Fire Brick.

Sole Agents for Paxton Rolling Mills.

STEEL AND IRON PLATES.

FRANCIS WISTER
COMMISSION MERCHANT,

Coke, Coal, Ores.

PEA AND BUCKWHEAT (Red and White Ash).

National Foundry Coke a Specialty. Sulphur less than 0.5.

All Sizes National Crushed Coke.

420 Walnut Street, PHILADELPHIA.

FRANCIS HOBSON, SEAMAN & CO.,

Successors to FRANCIS HOBSON & SON,
DON STEEL WORKS, SHEFFIELD.

Sole Manufacturers of

HOBSON'S "CHOICE" **(XX)** Extra Best and "Warranted Best"
Cast Steels for Tools, etc.

HOBSON'S "CHOICE" Extra Quality Needle Wire.

SEAMAN'S "**NELSON**" Brand Extra Cast Steel for Turning Hardest Chilled Rolls, &c.
WAREHOUSE, 97 John St., New York. CHAS. HUGILL, Agent.

THOS. FIRTH & SONS, LIMITED, SHEFFIELD.
CRUCIBLE CAST STEEL.

ABBOTT, WHEELOCK & CO., Agents and Importers of
SWEDISH IRON,

35 OLIVER ST., BOSTON.

23 CLIFF ST., NEW YORK.

S. & C. WARDLOW, SHEFFIELD, ENGLAND.

Manufacturers of the Celebrated Cast and Double Shear Steel,

in Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Razors, Carvers, Butchers' Knives, Files, Band Saws, Clock, Watch and all other Springs; also Sole Makers of the Special Brand "**TOUGH**" Cast Steel for Leather Splitting and Machine Knives of every description, and for Turning and all other Tools, Dies and Punches.

Office and Warehouse, 95 John St., New York.

Frank S. Pilditch, Agent.

CARLISLE KAYSER, ELLISON & CO., SHEFFIELD, ENGLAND
WORKS, Late WILSON HAWKSWORTH, ELLISON & CO.,

(ESTABLISHED 1825.)

CRUCIBLE STEEL AND STEEL WIRE.

WETHERELL BROS., Agents.

31 OLIVER STREET, BOSTON.

93 LIBERTY STREET, NEW YORK.

JONAS & COLVER CONTINENTAL STEEL WORKS, SHEFFIELD, ENGLAND,

MANUFACTURERS OF ALL KINDS OF STEEL.

Tool Steel, Drill Rods, Needle Wire, Hot Rolled Sheet Steel, Cold Rolled Steel for Corset Springs, Band Saws, Clock and Watch Springs and Parts, and all other Purposes

HERMANN BOKER & CO., 101 & 103 Duane Street,

(Formerly CARL F. BOKER),

Sole Agents and Importers of Steel and Crucible Wire Rods, &c.

JESSOP'S STEEL

MANUFACTURED BY

WM. JESSOP & SONS, L'D.

OF **Best Quality,**
IN **Bars, Sheets AND Plates.**

Large assortment of sizes in stock at

91 John St., - - - - - **NEW YORK.**

And other Agencies.

SHEFFIELD,
ENGLAND.

Gold Medal Paris,
1889.

WIRE

DRAWING

WORTLES, PLATES and JEWEL DIES.

DIES

NEWTON & SHIPMAN,

83 John St., - New York.

Coal Mining for the Use of Colliery Managers and others. By HERBERT W. HUGHES. In the preparation of this work the author's aim has been to supply a text-book containing all the information with which the student and the practical miner should be familiar. The details of general colliery work are fully described, and at the end of each chapter is given a carefully selected list of memoirs, in which fuller information can be sought. CONTENTS: Geology; Coal; Search for Coal; Breaking Ground; Sinking; Preliminary Operations; Methods of Working; Haulage; Winding; Pumping; Ventilation; Lighting; Works at Surface; Preparation of Coal for Market. 8vo, cloth, \$8.00.

For sale by DAVID WILLIAMS, 96-102 Reade St. N.Y.

Stay-Bolt,
Rivet, D. Link,
Axe, Hatchet,
Carriage and
Wagon Axle

IRON.

Superior Quality Refined Bar Iron
"VULCAN" AND "LOCKHART" BRANDS.



SMALL CHANNELS AND ANGLES,
HEXAGON IRON AND STEEL.

All
Merchant Bar
Sizes
of
Soft
STEEL.

Office, 218 S. Fourth St., Philadelphia.
Chicago Office, Phoenix Building.
(WORKS AT JOHNSTOWN, PA.)

MANUFACTURERS OF

DESIGNERS AND MANUFACTURERS OF

Bridges, Viaducts, Turn Tables, Etc.
WORKS, PENCYD, PA.

1 Broadway, New York. 8 Oliver Street, Boston.

19 KILBY ST., BOSTON.

BROKERS AND DEALERS IN

Correspondence solicited.

—DEALERS IN—

OF EVERY DESCRIPTION.

29 Broadway, cor. Morris St.,
NEW YORK.

MANUFACTURERS AND DEALERS IN

AGENCIES :

CARNEGIE STEEL CO., Limited. Structural Material, Steel and Iron Columns, Beams, Channels, Shapes and Plates. Steel Beams Rolled to 24 inches deep.

PORTAGE IRON CO., Limited, Merchant Iron,
Bars, Angles, Hoops and Cotton Ties.

BROOKLYN WIRE NAIL CO., Steel Wire
Nails. Export Nails & Specialty.

Nails. Export Nails a Specialty.
RIVERSIDE IRON WORKS, Steel Pipe.
GLASGOW TUBE WORKS, Boiler Flues.

GLASGOW TUBE WORKS, Boiler Flues.
AMERICAN WIRE NAIL MACHINES. Over
900 working satisfactorily in the United
States, 25 in Europe and 100 in Canada.

States, 25 in Europe and 100 in Canada.
THE SEIDELL & HASTINGS CO., Charcoal
Iron Boiler Plates.

Plans and estimates furnished and contracts made for Iron and Steel Structures of every description. Please address

P. O. Box 33. 29 Broadway, New York.

N. W. Cor. 23d and Race Streets,
PHILADELPHIA.

Correspondence solicited.

AMERICAN

(Bank of America Building.) 44 Wall St., N. Y.
Correspondence of Furnaces Invited

Best Grades of Tool ^{AND} and Machinery Steel.



Hundreds of testimonials showing these castings have proved the most satisfactory and economical for all purposes requiring strength and durability.

CHROME STEEL WORKS,
Brooklyn, N. Y.

ÆTNA-STANDARD IRON AND STEEL CO.,Successors to **Ætna Iron and Steel Co., and The Standard Iron Co.,** Manufacturers of**PLATES and SHEETS, BLACK, GALVANIZED and CORRUGATED Plain Roofing, Siding and Ceiling, also of Sheet Steel, for special purposes, Cold Rolled or Plain and Patent Leveled.****BARS, LIGHT SECTION RAILS, ANGLES, TEES and CHANNELS, odd sections and sizes, Machine Straightened Steel Tire, Ordinary Shafting, Horse-Shoe Bars, Ax-Poll Steel, Toe Calk, Nut, Bolt and Chain Rods, and other special Bars suited to every requirement.****PROMPT SHIPMENT from STOCK.**Inquiries solicited. Stock List Mailed on Application. Address, **BRIDGEPORT, OHIO.****CARBON STEEL COMPANY, PITTSBURGH, PA.**

—MANUFACTURERS OF—

Universal Mill Plates.
Sheared Plates and
Sheets.Boiler, Ship and Armor
Plates.
Also Nickel Steel Plates.**LIST OF SIZES SENT UPON APPLICATION.**

Eastern Office, Havemeyer Building, New York. Western Office, Western Union Building, Chicago.

AGENCIES:**L. S. BOOMER, 647 The Rookery, Chicago, Ill.****GEO. KINSEY & CO., 249 West Fourth Street, Cincinnati, O.****THE CONDIT-FULLER CO., Perry-Payne Building, Cleveland, O.****JAS. G. LINDSAY & CO., Bullitt Building, Philadelphia, Pa.****FLINT & CO.,**68 Broad St., New York,
EXPORTERS

—OF—

Rolling Stock, Rails and Railway Supplies
of all kinds, Bar and Sheet Iron and
Steel, Cast and Wrought Iron
Pipe, Boiler Plates, Barb
Wire, and all sorts of
Steel and Iron Man-
ufactures to**SOUTH AMERICA and WEST INDIES.****AGENCIES:**Quayle, Davidson & Co. - - Rio de Janeiro.
Luis de Olazarra. - - Havana.
Winfield S. Stern, - - Valparaiso.
F. L. Crosby, - - Lima.
E. Pavia, - - Guayaquil.Correspondence solicited from Manu-
facturers interested in export.**The Practical Brass and Iron
Founder's Guide.**A Treatise on Brass Founding, Molding,
the Metals and their Alloys, etc.By **JAMES LARKIN.**Late Conductor of the Brass Foundry Department of
the Penn Works, Philadelphia.

A New Revised and Greatly Enlarged Edition.

CONTENTS:Among the most important and entirely new sections
of this edition of this valuable and popular
book are the following:Behavior of Metals and Alloys in Melt-
ing and Congealing; Malleable Iron Cast-
ings; Wrought Iron or Mitis Castings;
Manufacture of Steel Castings; Casting of
Brass; Casting of Bronze; Bell Founding;
Chill Casting; Casting without Core;
Casting on to other Metals; Casting Iron
and other Metals upon Lace, Embroideries,
Fern Leaves and other Combustible Ma-
terials; Some Modern Bronzes.

In one volume, 12mo, 400 pages, \$2.50

Sent, postpaid, on receipt of price, by

DAVID WILLIAMS,

Bookseller and Publisher,

96 - 102 Reade Street, - New York.

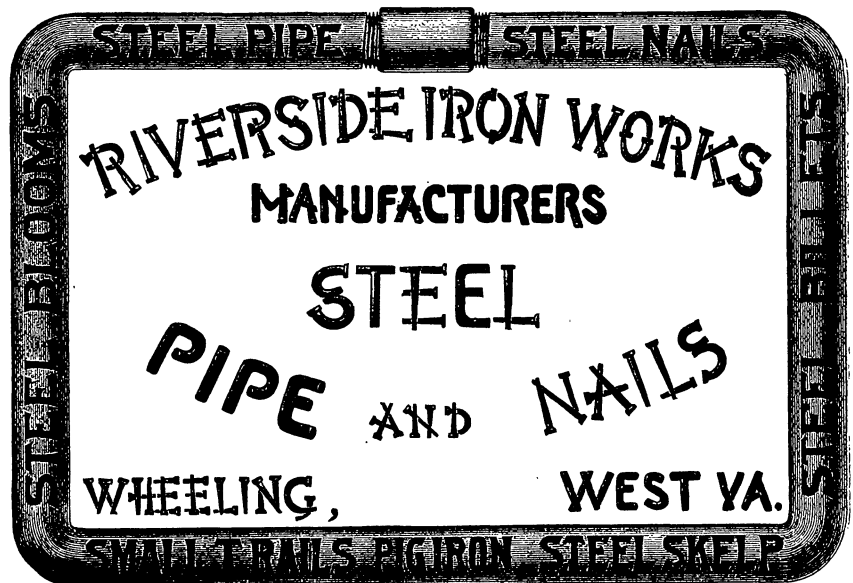
**- R. MUSHET'S -
"SPECIAL," STEEL "TITANIC,"**FOR
LATHE AND PLANER TOOLS.For Chisels, Taps, Dies, Chilled Roll
Turning, Punches, &c., &c.

(The "Trade-Marks" of which are registered in the United States.)

MANUFACTURED ONLY BY

SAMUEL OSBORN & CO., - - Clyde Steel & Iron Works, Sheffield, Eng.

SOLE REPRESENTATIVES IN THE UNITED STATES,

B. M. JONES & CO., Nos. 11 and 13 Oliver St., Boston.**No. 143 LIBERTY STREET, NEW YORK.****THE GARTLAND FOUNDRY CO.,**

MANUFACTURERS OF

Light Work our **Soft Grey Iron Castings.**We are prepared
to do Japanning and
Galvanizing.**UNION and ECHO STS.,
Cleveland, Canton & Southern R. R.,****CLEVELAND, O.****JOHN H. RICKETSON, Prest.****A. G. BARNETT, Treas.****W. L. RICKETSON, Supt.****O. G. RICKETSON, Vice-Prest.****A. G. McCLINTOCK, Sec'y.****A. GARRISON FOUNDRY CO.,**

Manufacturers of Sand, Patent Homogeneous Steel and

CHILLED ROLLS.Ore and Clay Pulverizers, Rotary Squeezers, Haskin's Patent Double Spiral Pinions and Rolling Mill Castings
of every description.**Office: Nos. 10 & 12 Wood St., - PITTSBURGH, PA.**

ESTABLISHED IN 1848. **SINGER, NIMICK & CO., Ltd.** PITTSBURGH, PA.

—MANUFACTURERS OF ALL KINDS OF—

Hammered and Rolled STEEL. Warranted Equal to any Produced.**HIGH GRADE SPECIAL Crucible Tool Cast Steel**, for all purposes requiring the **very finest** quality.**SINGER'S ANNEALED EXTRA Crucible Tool Cast Steel**, for Dies, Cutters, Surgical Instruments, Forceps, and all other purposes requiring an **extra fine** quality.**BEST Crucible Tool Cast Steel**, for all purposes requiring steel of **Standard** quality, such as Turning Tools, Taps, Dies, Drills, Punches, Shear Knives, Cold Chisels, or Edge and Machinists' Tools generally, and for Mining and Quarrying purposes.**SAW STEEL**, for Circular, Mulay, Mill, Gang, Drag, Pit and Cross-Cut Saws.**HOT ROLLED SHEET STEEL**, for Springs, Billet Web and Hand Saws, Nicker Saws, Pocket Knives, Blades and Backs, Drawing and Stamping Cold, &c., &c.**BRIGHT COLD ROLLED SHEET and STRIP STEEL**, for Cold Drawing, Stamping and Bending; for Bells, Cups, Ferrules, Springs, Keys, Chains, Sewing Machine and Type-Writer parts, and to take the place of Sheet Brass, all of unequalled finish and accuracy of gauge.**ROUND MACHINERY STEEL**, for Shafting, Rollers, Spindles, &c., &c.**AGRICULTURAL STEEL.**

"Iron Centre" Cast Plow Steel.

"Soft Steel Centre" Cast Plow Steel.

"Soft Steel Back" Cast Plow Steel.

"Extra Thick Face Centre" Cast Plow Steel.

"Special" (Solid Soft Center) Plow Steel.

Crucible Cast Plow Steel.

Steel Rotary Harrow Discs.

Finished Rolling Plow Colters.

Agricultural Steel Cut to Pattern.

Also Wagon and Carriage Springs, Axles and Steel Tire.

Represented at **243 Pearl and 18 Cliff Streets, NEW YORK**, by**HOGAN & SON, General Agents for Eastern and New England States.**

GEORGE M. HOGAN, 417 Commerce St., Philadelphia; FITZ, DANA & CO., 110 North St., Boston, and

W. E. STOCKTON, 16 & 18 West Lake St., Chicago.

HUGH RUSSEL, TEMPLE BUILDING, 185 ST. JAMES ST., MONTREAL, CANADA.

LA BELLE STEEL CO.,

Ridge Avenue and Belmont Street, Allegheny City, Pa. Post Office Address, Pittsburgh, Pa.

MANUFACTURERS OF ALL KINDS OF STEEL SPRINGS, AXLES, RAKE TEETH, Etc.**WETHERELL BROS., EASTERN REPRESENTATIVES, 31 Oliver St., Boston, and 93 Liberty St. N.Y.**

Canadian Agent, W. G. BLYTH, No. 76 York St., Toronto, Ont.

J. TATNALL LEA & CO.,

No. 125 So. Fourth St., Philadelphia.

**BESSEMER, MILL AND FOUNDRY PIG IRON,
MUCK BARS AND IRON ORES.**

— **SOHO IRON & STEEL WORKS** —

MOORHEAD & MCLEANE CO.
MANUFACTURERS OF

PLATE IRON & STEEL
GALVANIZED SHEET IRON

SOHO CHB TRADE MARK

PLATES SPECIAL WIDE
AND SHEETS AND EXTRA LONG
SKELP IRONS CORRUGATED & ROOFING IRONS

OFFICES AND WORKS.
PITTSBURGH.

EASTERN WAREHOUSE: No. 81 JOHN STREET, NEW YORK.
WESTERN WAREHOUSE: Nos. 16 & 18 W. LAKE ST. CHICAGO.

W. Dewees Wood Co.,

MANUFACTURERS OF PATENT

PLANISHED SHEET IRON.**PATENTS:**

Dec. 10th, 1878.	Mar. 4th, 1884.	Aug. 31st, 1886.
Jan. 10th, 1882.	April 16th, 1884.	Jan. 1st, 1889.
Jan. 1st, 1884.	June 10th, 1884.	Jan. 17th, 1893.
Feb. 12th, 1884.	Jan. 6th, 1886.	

Guaranteed fully equal, in all respects, to the Imported Russia Iron.

—ALSO—

Wood's Smooth Finished Sheet Irons and Sheet Steel, Cleaned and Free from Dust.

GENERAL OFFICES AND WORKS

McKESPORT, PA.

Branch Office: 111 Water Street, Pittsburgh, Pa.

Screws and Screw Making With a Chapter on the Milling Machine; a complete treatise on Screw Making in all its branches, embracing most recent methods and containing the reports which originated modern standard screw threads. With 95 illustrations. 16mo, cloth.....\$1.25
For Sale by David Williams, 96-102 Reade St., N.Y.**STANDARD FOUNDRY & MFG. CO., - CLEVELAND, OHIO.**

—HEADQUARTERS FOR—

LIGHT GRAY IRON CASTINGS,

—UNEQUALED IN—

SOFTNESS and SUPERIOR FINISH.Our Castings in finishing will save time and tools. We solicit a trial order knowing that we can please you
Send samples for prices.

"CATASAUQUA"
HIGH-GRADE
Bars.

CATASAUQUA MFG. CO.
Charles K. Barns & Co., Agents,
224 South Fourth St., PHILADELPHIA.

L. & R. WISTER & CO.,
257 So. 4th St., Philadelphia.

Dunbar Foundry and Forge Irons.
Kemble Pig Iron.
Tuscarawas (Black Band).
Warner & Co's Wash Irons.

Dealers in all kinds of Scrap Iron and Steel.

HENRY LEVIS & CO.,
Manufacturers' Agents

For Iron and Steel Rails, Car Wheels, Boiler
and Sheet Iron and General
Railway Equipments.
Old Rails, Axles and Wheels bought and sold.
284 S. 4th St., Philadelphia.

Manhattan Rolling Mill.

JOHN LEONARD,
446 to 452 West St., New York.
MANUFACTURER OF

HORSE SHOE AND BAR IRON
BLACKSMITH SUPPLIES.

OGDEN & WALLACE,

577, 579, 581 & 583 GREENWICH ST.,
NEW YORK.

IRON AND STEEL

Of every description kept in stock.

BLACK DIAMOND STEEL.

All sizes of Cast and Machinery Steel constantly
on hand.

WILLIAM H. WALLACE & CO.,
IRON AND STEEL

66 Broadway, New York.

Wm. H. Wallace. Wm. Bispham. E. C. Wallace.

THE MAHONING VALLEY IRON CO.

—MANUFACTURERS OF—

Bar, Band, Sheet, Plate and Tank Iron,
Angle Iron, Nails, Boat Spikes and Rivets.

YOUNGSTOWN, OHIO.

EXHAUST TUMBLERS,

Hexagon, Round or Wooden
BEST AND CHEAPEST.

WM. A. SWEETSER.

39 Montello St., Brockton, Mass.

THE
BETHLEHEM
IRON COMPANY,
SOUTH BETHLEHEM, PENNA.
STEEL RAILS,
BILLETS AND MUCK BAR,
STEEL FORGINGS.

HOLLOW SHAFTING, CRANKS, ROLLS, GUNS AND ARMOR.
Rough, Machined or Finished, Fluid Compressed, Hydraulic Forged.

NEW YORK OFFICE, - - - **80 BROADWAY.**
PHILADELPHIA OFFICE, - - - **421 CHESTNUT ST.**

THE S. OBERMAYER CO.,

Cincinnati, O., and Chicago, Ills.

—MANUFACTURERS OF—

FOUNDRY FACINGS, SUPPLIES and EQUIPMENTS

—IMPORTERS AND REFINERS OF—

East India Plumbago, Black Lead and Graphite.

Brass and Iron and Steel Foundries completely equipped.

General Catalogue sent on Application.

PASSAIC ROLLING MILL CO., Paterson, N. J.

—MANUFACTURE—

ROLLED STEEL or IRON BEAMS

Channels, Angles, Tees, Bars, Riveted Work, Forgings, Eye Bars, &c., &c.,

Also OPEN HEARTH STEEL BILLETS and SLABS.

NEW YORK OFFICE, - Rooms 151 and 152, No. 45 Broadway.

THE MONTGOMERY IRON & STEEL COMPANY,

DANVILLE, PA.



PIG IRON, T AND STREET RAILS,

Light Rails, 12 to 40 lbs. per yard.

RAIL JOINTS, SPIKES AND BAR IRON.

—ESTABLISHED 1850.—

ARCADE MALLEABLE IRON CO.

WARREN McFARLAND & CO.

Malleable Iron and Steel Castings,

WORCESTER, MASS.

Correspondence solicited. Prices given upon receipt of patterns
or samples.

GEO. B. BUCKINGHAM.

To Blast Furnace Managers:

THE Hawdon Slag Machine,

for handling blast-furnace slag, has been thoroughly tested in actual practice.

It saves labor in loading and unloading.

Slag is delivered to cars in small pieces, perfectly cooled.

It saves cost of special cars and expensive repairs.

Cost of pig is reduced and slag may be profitably used.

Write to us for further information in regard to advantages, cost of construction and
terms of license, or call and see the machine in operation at our Blast Furnaces.

Cambria Iron Company, - Johnstown, Pa.,

—UNITED STATES AGENT—

CHESS BROTHERS,

MANUFACTURERS OF A FULL LINE OF

SMALL CUT NAILS, TACKS, SHOE NAILS, ETC

Always in stock. Special goods made to order.

SOFT STEEL PLATES.

Suitable for Implement manufacture and for all Blanking or Stamping uses of good surface, rolled carefully to gauges, ranging from No. 6 to 16, inclusive, in widths up to 15½ inches and to multiples of lengths desired. Finished black or scaled. And

EXPANDED METAL

In all its varieties of

Fire-Proof Lath, Fencing Tree, Guards, &c.

Send for catalogues and prices.

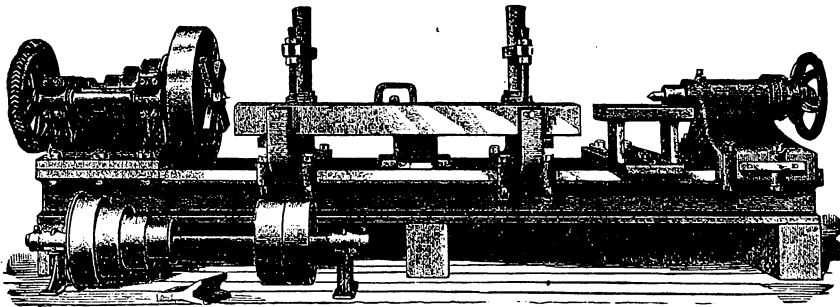
Office, 531 Wood St., PITTSBURGH, PA.

**J.S. SEAMAN,
ROBT. SLEETH
GEO. BLACK**

PHOENIX ROLL WORKS
SEAMAN, SLEETH & BLACK
OFFICE & WORKS
41ST & 42ND ST & AV. R.R.
PITTSBURGH, PA.

ROLLS AND PINIONS
MANUFACTURE AND FINISH
EXCLUSIVELY
FOR ALL PURPOSES.

ESTABLISHED 1870

NEW IMPROVED STANDARD ROLL LATHE.

Made by **TOTTEN & HOGG I & S FOUNDRY CO.,** Pittsburg, Pa., Manufacturers of
CHILL ROLLS AND ROLLING MILL MACHINERY.

GEORGE MESTA, Prest. W. D. ROWAN, Sec. J. O. HORNING, Treas

LEECHBURG FOUNDRY & MACHINE CO.,Office: **LEWIS BLOCK, Pittsburgh, Pa.**

Sheet and Bar Mills, Shears, Squeezers and Roll-Lathes

ROLLS. MESTA'S PATENT PICKLING MACHINES AND TIN PLATE MACHINERY.

ESTIMATES GIVEN ON COMPLETE TIN PLATE PLANTS.

RAIL. BEAM. BAR. ROLLS **STRUCTURAL. SPECIALS. SHAPES.**

EAST CHICAGO FOUNDRY COMPANY,Office, 716 "The Rookery," - - - **CHICAGO.****DROP FORGINGS**

OF EVERY DESCRIPTION, IN IRON, STEEL, COPPER and ALUMINUM.

Hoist Hooks, Shafting Collars, Eye Bolts, Wrenches, Machine Handles, Fence Ornaments.

SPECIAL ATTENTION GIVEN TO THE MANUFACTURE OF

SPECIAL FORGINGS.**PHILADELPHIA DROP FORCE COMPANY,**

Office and Works, S. E. Cor. American and York Sts., Philadelphia.

New York Agents: **BATT, BONNELL & THOMPSON, 34 Dey Street, N. Y.****BIRMINGHAM IRON FOUNDRY,****BIRMINGHAM, CONN.****CHILLED ROLLS AND ROLLING MILL MACHINERY,**

**McCoy Patent Mill Pinions,
Shears, Rotary Squeezers.**

WIRE DRAWING MACHINERY

Special Rolling Machines for Gun Barrels, Hoes, Pick and Axe Polls, Odd Shapes and Tapers.

ESTABLISHED

1836.

POWDER

—FOR—

Blasting, Mining and Sporting.
ORANGE BRAND.

ELECTRIC BLASTING APPARATUS**SAFETY FUSE, &c.**

Send postal card for Illustrated Pamphlet, showing sizes grains Powder, and describing Blasting Apparatus. Mailed **FREE.**

LAFLIN & RAND POWDER CO.,

New York Office, 29 Murray St.

DYNAMITE,**RED STAR BRAND,**

For Mining, Quarrying and Stump Blasting.

Safety Fuse, Caps, Platinum Fuse, Leading and Connecting Wire, with every other requisite for Blasting Purposes. The especial attention of the hardware trade is invited to our line of goods.

NEW YORK POWDER CO.,

62 Liberty St., New York.

Patent Tumbling Barrels.**MANY VARIETIES****For all Kinds of Work.**

Send for new Catalogue.

HENDERSON BROS., WATERBURY, CONN.**S. CHENEY & SON,
GRAY IRON CASTINGS,****CHEAP HEATING STOVES,****DIAMOND THIMBLES.****MANLIUS, N. Y.****DONALDSON IRON COMPANY,**

MANUFACTURERS OF

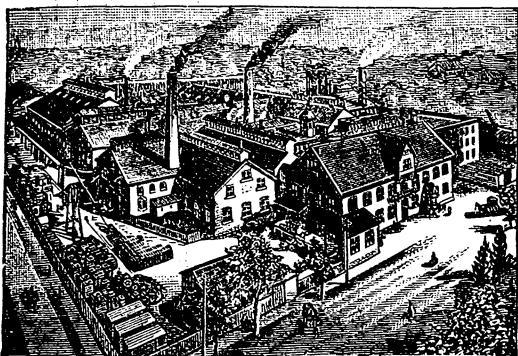


CAST IRON PIPE
And Special Castings for Water and Gas. Also Flange Pipe
Emaus, Lehigh Co., Pa.

FINE GRAY IRON**FRANKLIN IRON FOUNDRY,****The Burr and Houston Company**

33-39 Franklin Street, Brooklyn (Greenpoint), N. Y.

Special Attention Given to Fine Castings.
Telephone Call, Greenpoint 174



Sessions Foundry Co., BRISTOL, CONN. IRON CASTINGS TO ORDER.

We make small and large castings of all descriptions, of best quality, and at very low prices.

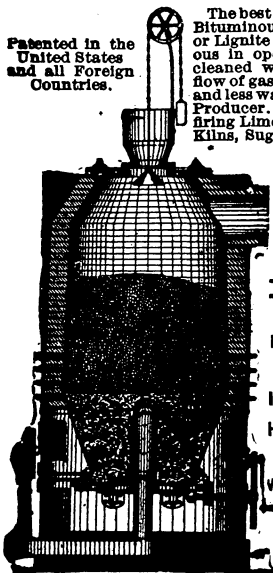
CORRESPONDENCE SOLICITED.

R. D. Wood & Co. 400 Chestnut St.,
PHILADELPHIA.

SOLE MAKERS OF THE

TAYLOR REVOLVING-BOTTOM GAS PRODUCER.

Patented in the
United States
and all Foreign
Countries.



The best Producer for either Bituminous or Anthracite coal or Lignite; absolutely continuous in operation, as the fire is cleaned without stopping the flow of gas. Less labor required and less waste than in any other Producer. Producer Gas for firing Lime, Brick and Pottery Kilns, Sugar-house Char Kilns, Boilers, etc.
Also applicable to all Regenerative Furnaces.
Send for Pamphlet

CAST IRON PIPE

MATHEWS' FIRE HYDRANTS
EDDY VALVES,
VALVE
INDICATOR POSTS.

Heavy Loom Castings
Special Machinery.
Water Power Pumps
and
TURBINES.

HYDRAULIC JIB and TRAVELING CRANES.

FREIGHT and CAR LIFTS, Etc.

GAS HOLDERS and GAS MACHINERY.

The Iron-Masters' LABORATORY

Exclusively for the

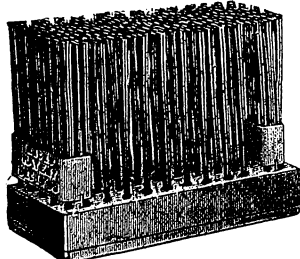
Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestones, Clays, Slags and Coal for Practical Metallurgical Purposes.

Branch Office, 239 Walnut St., Philadelphia.

All Analytical Work at Warrenton, Virginia.
J. BLODGET BRITTON.

This laboratory was established in 1866, at the instance of a number of practical Iron Masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes, the object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

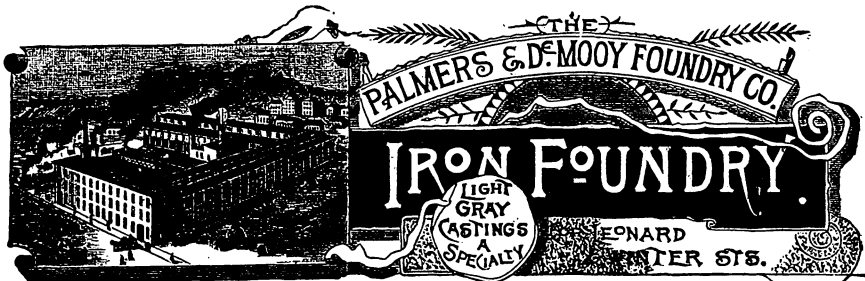
Rice's Pat. Casting Brush



will outwear three of any other kind. Our prices the lowest.

Send for Circular.

THE RICE
MFG. CO.,
New Durham,
N. H.



Soft Castings for Electrical Work and Sewing Machines. Fine Light Gray Iron Castings. Metal Patterns designed and made. Also Japanning and Galvanizing. CLEVELAND, O.

STEEL CASTINGS

FROM 1 to 40,000 POUNDS WEIGHT,
Of Open Hearth, Chester or Bessemer Steel.
True to Pattern. Sound. Solid.

Gearing of all kinds, Crank Shafts, Knuckles for Car Couplers.

Cross-Heads, Rockers, Piston-Heads, etc., for Locomotives.

Steel Castings of Every Description.

Chester Steel Castings Co.
Works, Chester, Pa. Office, 407 Library St., Philadelphia, Pa.

ROLLING MILL MACHINERY AND

ROLLS.

THE ROBINSON-REA MFG. CO., Pittsburg, Pa.

RADIANT FACINGS

Are used by progressive foundries who want to turn out good clean castings.

If you don't use it and wish to try some send for free sample.

THE J. D. SMITH FOUNDRY SUPPLY CO., - CINCINNATI, O.

DROP FORGING.

ESTIMATES GIVEN ON APPLICATION.

Sole Manufacturers of Ahlstrom's Patent Parallel Double

EXPANSION BOLTS,

also Single Expansion Bolts. Catalogues mailed on Application.

W. C. BOONE MFG. CO. - Office and Factory, - BOONTON, N. J.

Cranes AND Derricks.

W. S. HALSEY & CO., - Birdsboro, Pa.

Pennsylvania Diamond Drill & Manufacturing Co.
BIRDSBORO, PA

Drill Press and Planer Chucks. Steam and Gas Engines. Diamond Pointed Core Prospecting Drills. Boiler Fronts and General Castings. Mineral Lands Prospected and Artesian Wells Bored by Contract.

MACHINERY & ENGINEERING CO., Western Sales Agents, Chicago.

Tool Steel TRETHEWEY MFG. CO., - 47th ST., PITTSBURGH, PA.

MANUFACTURERS OF

Dies Of any size.

Forgings of Machinery or Tool Steel, Rolling Mill Machinery, Steam Hammers, Squaring Shears, Double Headed Rotary Shears, Shear Grinding Machinery, Circle Cutting Machines, Roll Lathes, Hardened Forged Steel Rolls, Roll Turning Tools. Solid Steel Shear Knives.

SMITH'S LABOR-SAVING LEATHER PATTERN FILLET.

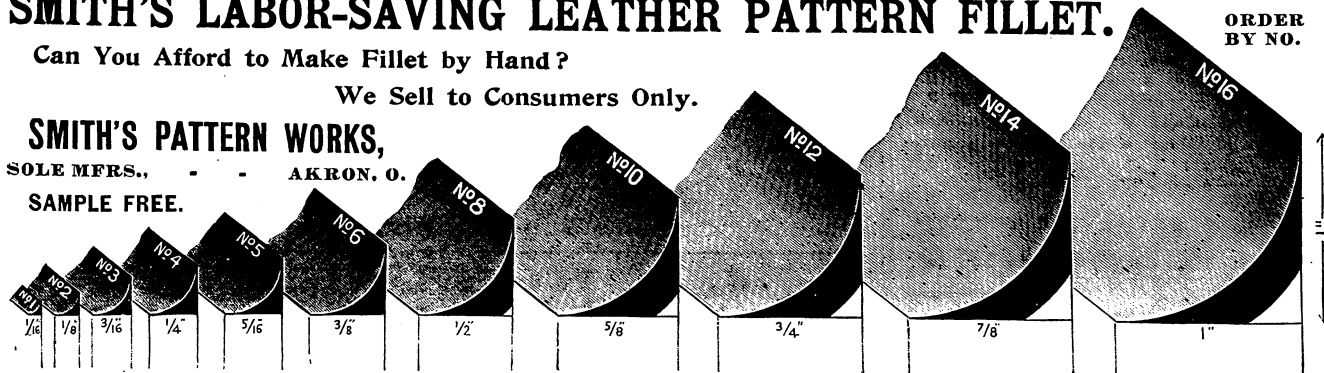
Can You Afford to Make Fillet by Hand?

We Sell to Consumers Only.

SMITH'S PATTERN WORKS,

SOLE MFRS., - - AKRON, O.

SAMPLE FREE.

ORDER
BY NO.

THE S. R. SMYTHE COMPANY,

LEWIS BLOCK, ENGINEERS AND CONTRACTORS, PITTSBURGH, PA.

**Regenerative Gas Furnaces and Gas Producers
For All Purposes.**

TUBE, STEEL, ROLLING MILLS, GLASS WORKS CONSTRUCTION, Etc.

We contract for complete Plants, guarantee results and operation. OVER 100 PLANTS BUILT AND WORKING.

McAULEY FEED WATER HEATER AND PURIFIER. Clean Boilers Guaranteed at small cost. No scale, better service, and saving in fuel.

JULIAN KENNEDY

Consulting and Contracting Engineer,

Rooms 36, 37, 38, 39 Vandergrift Building, Pittsburgh, Pa.

Blast Furnaces, Bessemer and Open Hearth Steel Works, Rolling Mills,

STEAM AND HYDRAULIC MACHINERY, &c.

—Branch Office of The Latrobe Steel Works.—

Wm. Swindell & Bros.,

ENGINEERS AND CONTRACTORS,

**Regenerative and Recuperative Gas Furnaces for
Steel, Iron and Glass.**

SWINDELL'S IMPROVED GAS PRODUCERS,

243 BUILT SINCE APRIL 1, 1891.

P. O. Box 945.

548 Smithfield St., Pittsburgh, Pa.

ESTIMATES

GIVEN ON ALL
KINDS OF

HEAVY MACHINERY AND CASTINGS.

THE BEST EQUIPPED FOUNDRY AND MACHINE SHOP IN AMERICA FOR HEAVY WORK.

THE WALKER MFG. CO.,

CLEVELAND, OHIO.

ALEX LAUGHLIN & CO.

LEWIS BLOCK, PITTSBURGH, PA.

Gas Heating
Gas Puddling
Open Hearth
Crucible
Tube Welding

FURNACES

AND ARTIFICIAL GAS PRODUCERS OF
EVERY DESCRIPTION, for ROLLING MILLS
STEEL AND TUBE WORKS.

We guarantee to place all Plants erected by us in successful operation.

HENRY AIKEN,

Consulting Mechanical Engineer

Rooms 203-206 Lewis Block,

PITTSBURGH, PA.

VADE MECUM.

A work of reference for the use of Architects, Architectural Iron Workers, Builders, Blacksmiths, Bookkeepers, Boiler Makers, Contractors, Civil, Mechanical, Hydraulic, Mining, Stationary, Marine and Locomotive Engineers. For men of Machine Shops, Firemen, Master Mechanics of Railroads, Master Car Builders, Machine Shop Proprietors, Machinery Jobbers, Machinery Salesmen, Machinists, Pattern Makers, Railway Superintendents, Railway Supply Agents, Roadmasters, Superintendents of Factories and Business Men generally.

Compiled and Arranged by

D. B. DIXON,

And with a most exhaustive Electrical Department by

THOS. G. GRIER,

A Prominent Specialist.

480 Pages, 8 1/4 x 5 1/2 inches, Cloth, \$2.50.

Sent postpaid on receipt of price by

DAVID WILLIAMS, Publisher and Bookseller.

96-102 Reade St., New York.

McCLURE & AMSLER,
Engineers and Contractors,
Bissel Block Pittsburgh, Pa.

Blast Furnace Construction
A SPECIALTY.

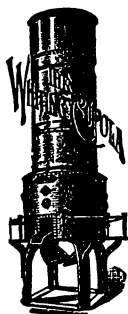
General Agents for Massick's and Crooke's Patent Fire Brick Stoves; Designs and Estimates for the construction of Blast Furnace Work, and for all kinds of Hot Blast Fire Brick or Pipe Stoves; and all other kinds of Brick Work pertaining to Steel Plants, Iron, Brick or Wooden Buildings, all kinds of Iron Construction in general.

We propose to put into successful operation all the plants we design and contract for.

Whiting Foundry Equipment Co.,

225 Dearborn St., Chicago, Ill.

SUCCESSORS TO
DETROIT FOUNDRY EQUIPMENT CO.



**CUPOLAS,
CRANES,
LADLES,
Elevators, Tumblers,
Trucks, Sand Sifters.**
—Complete Foundry Outfitters.—

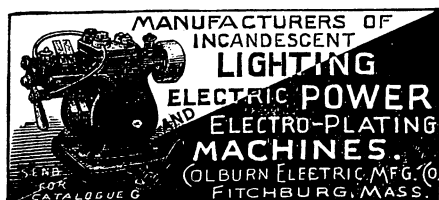
M. V. SMITH, PRES.
G. C. MORROW, SEC.

M. A. GREENE, VICE-PRES.
JOHN A. ELLIOTT, TREAS.

**Artificial Gas
Engineering Co.**
Consulting and Contracting
ENGINEERS.

ARTIFICIAL Gas applied to all Branches of Manufacturing and Domestic Uses. Apparatus for the Manufacture of Coal-Gas Furnished at Lowest Prices

**706 TIMES BUILDING
PITTSBURGH, PA.**



JAMES HEMPHILL, President.
WM. H. CONLEY, Treasurer.

THOS. B. RITER, Vice-President.
JNO. F. WILCOX, Gen'l Manager.

PITTSBURGH IRON & STEEL ENGINEERING CO.
LEWIS BLOCK, PITTSBURGH, PA., U. S. A.

BESSEMER AND OPEN-HEARTH STEEL PLANTS.
Rolling Mills (Blooming, Rail, Plate, &c). Blast Furnaces, Engines
Boilers, Bridges, Girders, Iron Buildings.

WORKS BUILT COMPLETE and Fully Equipped for Operation.

THE D. R. LEAN COMPANY,
**Blast Furnace and
Steel Plant Construction,**
Penn Building, Pittsburgh, Pa.

J. A. HERRICK, M. E.,
Consulting Engineer and Contractor:
Room 609, 284 Pearl Street, NEW YORK.
— **STEEL CASTING PLANTS A SPECIALTY.** —
Melting and Heating Furnaces of ALL KINDS.
Patent Gas WATER VALVES. Improved "BASIC" and "SEMI-STEEL" Processes and FURNACES.
New CONTINUOUS Gas PRODUCERS.

PHILADELPHIA CORLISS ENGINES,
Air Pumps, Condensers, Feed Water Heaters,
Steel Plate Chimneys, Iron Tanks, Stand
Pipes, Steel Buildings.

BLAST FURNACES. HOT BLAST STOVES.

Philadelphia Engineering Works, Ltd.,
Philadelphia, Pa., U. S. A.

Selling Agents:

New York, Wm. M. Power, 121 Liberty St.
Chicago, Wm. - Parish Machinery Co., Home Insurance Building.
Buffalo, Rose H. Aldrich, 42 Builders' Exchange.
Rochester, W. J. Creelman, 818 Granite Building.
Charlotte, N. C., Mecklenburg Iron Works.

EDITION FOR 1894. DIRECTORY

— OF THE —

Iron and Steel Works
OF THE UNITED STATES.

Embracing a complete list of the Blast Furnaces, Rolling Mills, Steel Works, Forges and Bloomeries in every State and Territory; also Wire Mills, Wire Nail Works, Car Axle Works, Car Wheel Works, Car Builders, Locomotive Works and Cast Iron Pipe Works and Wrought Iron Pipe Works, Tin Plate Works, Rod Mills, Cut Nail Works, Shipbuilding and Bridge-building Works. 304 pages, cloth.

Published by The American Iron and Steel Association.

PRICE, - - - \$5.00.

Sent on receipt of price by

DAVID WILLIAMS, - Publisher and Bookseller,
96-102 Reade Street, NEW YORK.

CYRUS BORGNER.
SUCCESSOR TO GARDNER & COMPANY
23° ST. ABOVE RACE, PHILADA., PA. U.S.A.

FIRE BRICK
AND
CLAY RETORTS.

MADE IN AMERICA
SHOULD BE USED IN CHIMNEYS

ESTABLISHED 1856.

MANUFACTURERS OF

of all Shapes and Sizes,

420 E. 23d St., New York.

BEST AND CHEAPEST.

ESTABLISHED 1845.

Office, foot of Houston Street, East River, NEW YORK.

ESTABLISHED 1864.

MANUFACTURERS OF

OF ALL SHAPES AND SIZES.

WORKS, Ellerslie, Allegheny Co., Md.

OFFICE, Cumberland, Md., P. O. Box 540.

S. M. Hamilton & Co., Agents, - Baltimore, Md
Stowe, Fuller & Co., Agents, - Cleveland, O.

Established 1848.

Ostrander Fire Brick Company

Manufacture Fire Brick for all purposes.

Works at TROY, N. Y., and OSTRANDER, N. J.
Main Office, TROY, N. Y., to which correspondence
should be addressed.

Export Agent. J. W. D. Melghan, 111 Water St.,
New York City.

A Trial will Convince You

THAT WE MAKE

SOFT AND SMOOTH

Light Gray Iron Castings,

- - SOUND - -

Brass and Bronze Castings

TRUE TO THE PATTERN.

Also HAVE FACILITIES FOR FINISHING.
Sample for estimate solicited.

I. S. SPENCER'S SONS, Guilford, Conn.

HIGH GRADE

LIGHT GRAY IRON CASTINGS

SOFT, SMOOTH and EASILY DRILLED.

Patented Articles a Specialty.

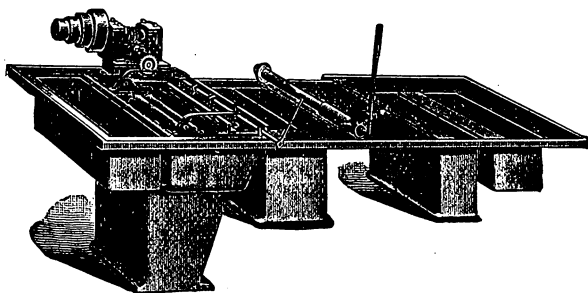
SUPERIOR QUALITY. PRICES LOW.

Allentown Hardware Works,
ALLENTOWN, PA.



VULCAN IRON WORKS
CHICAGO
PILE DRIVERS

Tinning MACHINERY.



Rolling Mills

Sand and Chill

ROLLS.

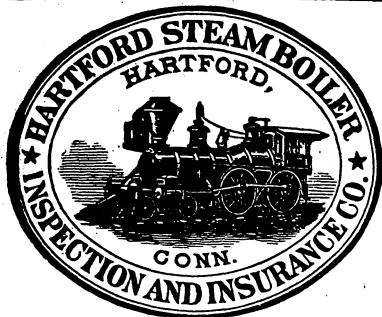
GRAY IRON, BRASS, ALUMINUM and ALUMINUM BRONZE CASTINGS
of the very best quality.

Very much time saved by using clean and soft castings. We use only the best material. A trial will convince you. PICKETS and ROSETTES for Wire Workers. Catalogue of same. NICKEL PLATING and JAPANING, also METAL PATTERN MAKING and LIGHT MACHINE WORK. We invite correspondence.

HAIGHT & CLARK. - - ALBANY, N. Y.



SEND FOR CATALOGUE A.



THOROUGH INSPECTIONS

And Insurance against loss or damage to property and loss of life and injury to persons caused by

Steam Boiler Explosions

J. M. ALLEN, Pres. WM. B. FRANKLIN, Vice-Pres. F. B. ALLEN, 2d Vice-Pres. J. B. PIERCE, Sec. and Treas.

BOARD OF DIRECTORS:

J. M. ALLEN, President.
FRANK W. CHENEY, of Cheney Brothers Silk Manufacturing Co.
CHARLES M. BEACH, of Beach & Co.
DANIEL PHILLIPS, of Adams Express Company.
RICHARD W. H. JARVIS, President Colt's Fire Arms Manufacturing Co.
THOMAS O. ENDERS, of the United States Bank.
LEVERETT BRAINARD, of the Case, Lockwood & Brainard Co.
GEN. WM. B. FRANKLIN, late Vice-President Colt's Pat. Fire Arms Mfg. Co.
NELSON HOLLISTER, of the State Bank, Hartford.

HON. HENRY C. ROBINSON, Attorney at Law, Hartford.
HON. FRANCIS B. COOLEY, of the National Exchange Bank, Hartford, Conn.
A. W. JILLSON, late Vice-Prest. Phoenix Fire Insurance Co., Hartford, Conn.
EDMUND A. STEADMAN, President of the Fidelity Co., Hartford, Conn.
GEORGE BURNHAM, Baldwin Locomotive Works, Philadelphia.
HON. NATHANIEL SHIPMAN, Judge U. S. Circuit Court.
C. C. KIMBALL, Prest. Smythe Manufacturing Co., Hartford, Conn.
PHILIP CORBIN, of P. & F. Corbin, New Britain, Conn.

THE EYNON-EVANS MANUFACTURING CO.,

Patentees and
Manufacturers of

THE EYNON-KORTING COMPOUND INJECTORS.

Extra Heavy Globe and Angle Valves.  Brass Castings up to 5 000 lbs

Blowers, Ventilators, Blast Nozzles, Exhausters, Brass Syphons, Acid Syphons, Condensers.

Fifteenth and Clearfield Sts., Philadelphia, Pa.

THE C. & C. ELECTRIC COMPANY,

—MANUFACTURERS OF—

MULTIPOLAR DYNAMOS, DIREC DRIVEN OR BELTED,

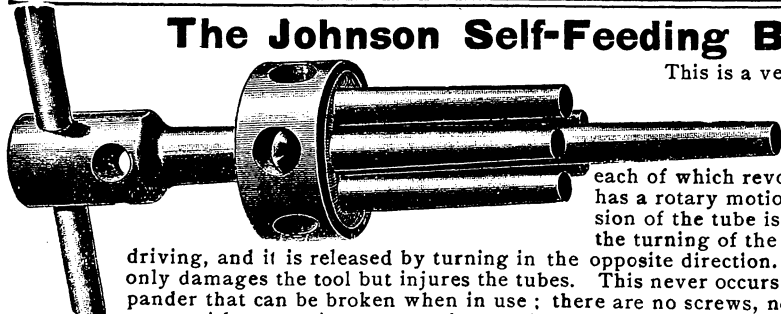
IN SIZES UP TO 250 H.P.

Bipolar Dynamos up to 100 H.-P. Electric Motors, Automatic or Hand Controlled. Complete Plants for Power Transmission. Isolated Lighting Plants. Central Station Apparatus.

General Office, 143 Liberty St., New York. Works, Garwood, N. J., on Central R. R. of N. J.

BRANCH OFFICES: CHICAGO, Monadnock Building. BOSTON, 63 Oliver Street. CLEVELAND, Cuyahoga Building. PHILADELPHIA, 633 Arch Street.

The Johnson Self-Feeding Boiler Tube Expander.



driving, and it is released by turning in the opposite direction. The driving of the centre pin of an expander not only damages the tool but injures the tubes. This never occurs with the JOHNSON TOOL. There is no part of this expander that can be broken when in use; there are no screws, no casings, no rollers on pivots. It will wear for years without costing a penny for repairs.

This is a very simple and efficient tool; it is constructed on correct mechanical principles, and it does its work more effectively and in less time than any other expander made; it will outwear three similar tools of any other manufacture. There are five small rollers,

each of which revolves when the centre pin is turned and the tool itself has a rotary motion which produces a uniform pressure and the expansion of the tube is perfect; the small rollers being started at an angle, the turning of the centre pin feeds the expander into the tube without the turning of the centre pin. Henry C. Ayer & Gleason Co., N. E. Cor. 2d and Diamond Sts., Central Office, No. 919 Betz Bldg., PHILADELPHIA, PA.

Electric Motor Construction for Amateurs.

By C. D. PARKHURST.

Gives directions and working drawings for making an electric motor to run sewing machines, small lathes, etc., with rules for constructing the battery to furnish the electrical current, and much practical relative information.

A table indicating the difference in wire gauges is included.

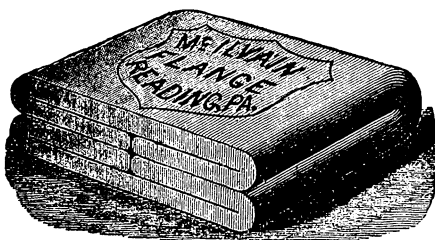
Price, \$1.00.

Sent, post-paid, upon receipt of price, by

DAVID WILLIAMS, Publisher and Bookseller

96-102 Reade Street, New York.

TENSILE STRAIN. } 56,000 to 64,000 lbs.



CAPACITY. { Plates 1 inch thick to No. 12.
30 feet long.
70 inches wide.

WM. McILVAIN & SONS,

READING, PA.,

MANUFACTURERS OF

IRON AND STEEL BOILER PLATES.

Locomotive, Fire Box, Flange, Shell, Tank Iron and Steel, including Plates for Bridges, Girders, Stacks, Pipe and Fire and Burglar-proof Safes.

THE ALLENTOWN ROLLING MILLS,

MANUFACTURERS OF

Fig Iron, Merchant Bar Iron, Rolled Shafting, Mine Rails, I-Beams, Tee Bars, Fish Plates, Bolts, Nuts and Spikes.

Transfer and Locomotive Turn Tables, Blast Furnace, Rolling Mill and Mining Machinery, Mining Pumps, Etc. Roll Trains, Shears, Punches, Iron Trucks, Etc. Builders of all classes of Machinery. Makers of Castings of all descriptions for Cable and Electric Railway.

ALLENTOWN, PA.



CLOSE REGULATION.
HIGH ECONOMY.

SOUTHWARK FOUNDRY — AND — MACHINE COMPANY,

Philadelphia, Pa.

Sole Makers of

THE PORTER-ALLEN
AUTOMATIC ENGINE,

SIMPLE, COMPOUND
OR TRIPLE EXPANSION.

Also Builders of
BLOWING ENGINES,
REVERSING ENGINES,
CENTRIFUGAL PUMPS,
BOILERS, TANKS, ETC.

CHICAGO, 554 ROOKERY.
ST. LOUIS, 32 LACLEDE BLDG.



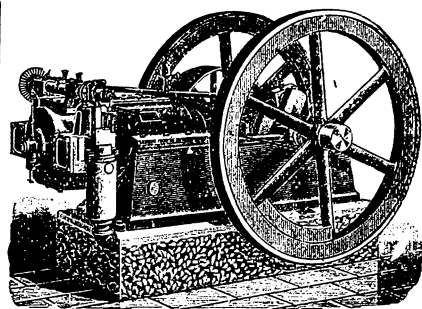
ARE universally known,
used, adopted and speci-
fied where always the
best is wanted.

ALWAYS as represented.
ALWAYS reliable.
ALWAYS satisfactory.

We could tell more, but
this space is valuable.
You had better send for
our catalogue of superior
Steam Specialties, and
get posted.

All goods marked "LUNKENHEIMER" are warranted. You make no
mistake by adopting them, if you want the best. If you order from your
dealer specify and insist on our make.

THE LUNKENHEIMER COMPANY,
CINCINNATI, O., U. S. A.



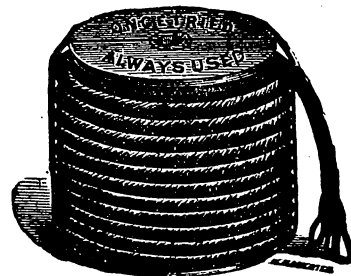
Gas and Gasoline ENGINES,

Using Natural Gas, Coal Gas, Producer,
Gas and Gasoline direct from the tank.
1 to 40 H. P., actual.

THE SPRINGFIELD GAS ENGINE CO.,
20 W. Washington St.. Springfield, O.

Wm A. Harris
Steam Engine Co.,
BUILDERS OF

Harris-Corliss Engines,
PROVIDENCE, R. I.



Send for a Sample of
Morrison's Patent Self-Lubricating Packing

ROBT. MORRISON,

5034 Arsenal St., St. Louis, Mo.

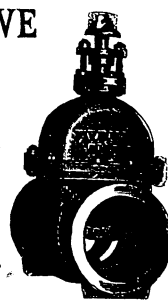
CHAPMAN VALVE
MFG. CO.,

Manufacturers of

VALVES & GATES

For Water, Steam, Gas,
Ammonia, &c.

GATE FIRE HYDRANTS,
With and without independ-
ent outlets.

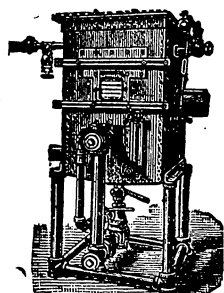


We make a specialty of Valves with Bronze
Seats for High Pressure steam.
Works and General Office,

INDIAN ORCHARD, MASS.
Treasurer's Office, 72 Kilby and 112 Milk Streets,
Boston, Mass.

Chicago Office, 24 West Lake St. New York Office
728 Platt Street.
L. M. Rumsey Mfg. Co., St. Louis, Mo., South-
Western Agents.

BEVEL GEARS
PLANNED PERFECTLY BY PATENTED PROCESS
GLEASON TOOL CO.
ROCHESTER, N. Y.



WE NEVER SOLD ONE

of our Vacuum Feed Water Heaters and Purifiers until
we had first satisfied our customer that it was capable of saving
money for him. Our Catalogue will make this saving clear to
you. Shall we mail it? We also build the Webster Separator
and Williams Vacuum System of Steam Heating.

WARREN WEBSTER & Co.,

NEW YORK, 126 Liberty Street.
CHICAGO, Monadnock Building.

No. 8.

CAMDEN, N. J.

STEAM

— IS RELIEVED OF —

OIL AND WATER

By passing through Webster Separators.

SEND FOR COPY OF TESTS AND CATALOGUE TO

WARREN WEBSTER & CO., - Camden, N. J.

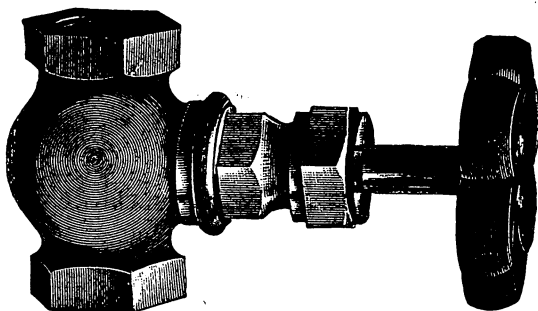


MERRILL BROS., 465 to 471 Kent Ave., Brooklyn, E. D., N. Y.

**BLAST FURNACES,
ROLLING MILLS,
STEEL WORKS,
MINES, ETC.,
ETC.**



**OIL WELLS,
REFINERIES,
ELECTRIC LIGHT PLANTS,
WATER WORKS, ETC.,
ETC.**



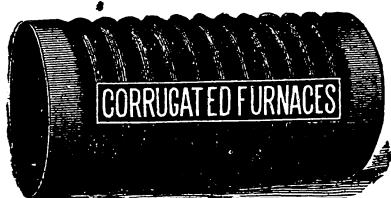
McNAB & HARLIN MFG. CO.,
—MANUFACTURERS OF—
BRASS COCKS AND VALVES
For Steam, Water and Gas.

Wrought Iron Pipe and Fittings. Plumbers' Materials. Seamless
Brass and Copper Tubes.

Factory, PATERSON, N. J.

56 JOHN ST., N. Y.

Catalogue and Price-List will be sent to the Trade with their first order, or by express, if desired, before ordering.



THE CONTINENTAL IRON WORKS

West and Calyer Streets, BROOKLYN, N. Y.,

—SOLE MANUFACTURERS OF—

**CORRUGATED FURNACES, FOR MARINE AND
LAND BOILERS.**

Made in sizes from 28 in. to 60 in. diameter, with flanged or plain ends.

Thos. F. Rowland, Pres.
Thos. F. Rowland, Jr., Treas.

Warren E. Hill,
Chas. H. Corbett,

Vice-Pres.

Take Ferry from East 10th or 23d Streets, N. Y., to Greenpoint.

OIL

AND

WATER

EASILY AND COMPLETELY RE-
MOVED FROM

STEAM

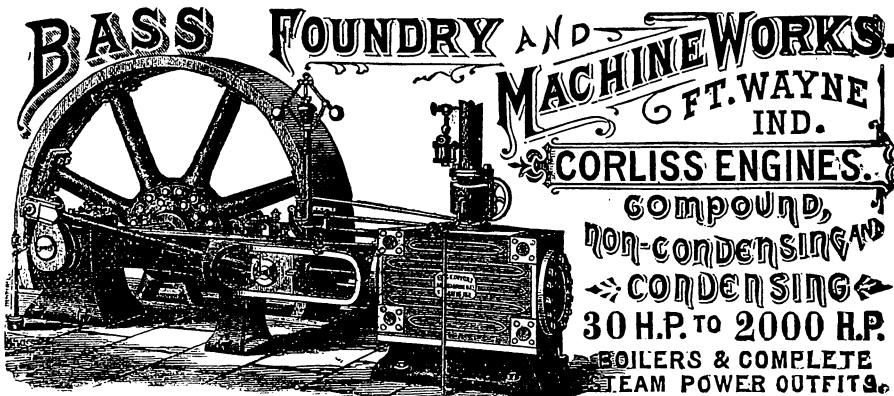
BY OUR

Cochrane Separators

FOR HORIZONTAL OR VERTICAL
PIPES.

FOR PARTICULARS ADDRESS

Harrison Safety Boiler Wks.,
Germantown Junction. PHILADELPHIA, PA.



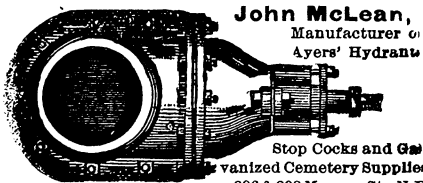
WILLIAM TOD & CO.

YOUNGSTOWN, OHIO.

SINGLE, COMPOUND
AND CONDENSING.

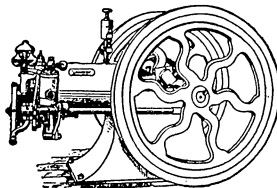
**PORTER-HAMILTON
ENGINE**

Blowing Engines,
Hydraulic Cranes & Accumulators
Heavy Special Machinery.
ENGINE CATALOGUE ON APPLICATION.



The "Lambert" Gas and Gasoline Engines.

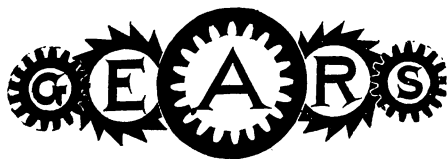
POWER from natural gas,
coal gas and gasoline di-
rect from tank. 1 to 50 H.-P.
stationary; 6 to 20 H.-P. port-
able. Reliable power for less
than 1 cent per hour per H.-P.
No boiler, no fire, no steam, no



engineer, no dirt and perfectly
safe. Suitable for running all
kinds of manufacturing plants,
electric light plants and for all
purposes where reliable power
is required. Write for descrip-
tion and prices.

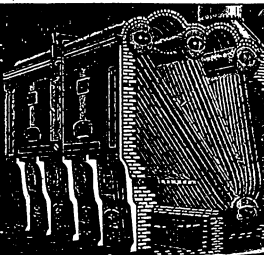
THE BUCKEYE MFG. CO., 50, 54, 52 and 53 Division St.,

UNION CITY, IND.



Every style large or small. (See Catalogue).
BOSTON GEAR WORKS, 37 Hartford St., Boston, Mass.

SAFE. EFFICIENT.
ECONOMICAL.
DURABLE.
PRACTICALLY
SELF-CLEANING.
NO CAST METAL.



NO FLAT SURFACES.
NO STAY BOLTS.
REMOVAL OF FOUR
MANHOLE PLATES
GIVES ACCESS TO
EVERY PART.

THE STIRLING WATER TUBE SAFETY BOILER.

74 Cortlandt St., New York.
418 Walnut St., Phila.
Cuyahoga Building, Cleveland.

THE STIRLING CO.,
Gen'l Offices, Pullman Building,
CHICAGO, ILL.

POWER FROM GASOLINE.

DIRECT FROM THE TANK.

CHEAPER THAN STEAM. No Boiler. No Steam. No Engineer.

FOR USE EVERYWHERE.

OTTO GASOLINE ENGINES, Stationary or Portable.

1 to 50 H. P. 8 to 20 H. P.

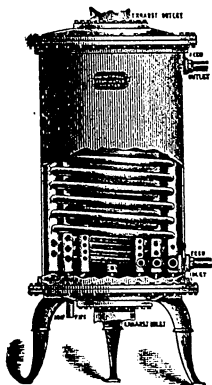
Running Expenses, Less than one cent per horse power per hour. For large engines, one-half cent per horse power per hour. Suitable for all manufacturing purposes, Electric Lighting, Town Water Supply. The Best Auxiliary Power for Night Work.

OTTO GAS ENGINE WORKS,

33d and Walnut Sts., PHILADELPHIA, PA.

CHICAGO OFFICE: 245 Lake St.

BOSTON OFFICE: 19 Pearl St.



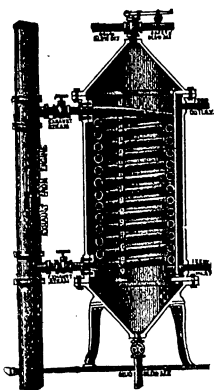
The National Feed Water Heater

is a BRASS COIL HEATER, delivering water to the boilers at 212° Fahrenheit. It is low in price, but unequalled in efficiency. 500,000 H. P. in daily use attests its merits.

Coils and Bends of Iron, Brass, and Copper Pipe.

THE NATIONAL PIPE BENDING CO.,

98 River St., New Haven, Conn.



THE AMERICAN FEED WATER HEATER

Received the First Prize at the

Mechanics' Association Fair, - Boston, Mass.

What you get when you buy the AMERICAN HEATERS:

COPPER COILS,
SOLIDLY BRAZED,
GUN METAL FITTINGS
AND CLAMP STAYS,
STEEL SHELLS,

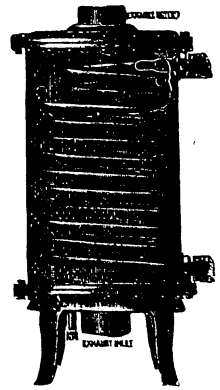
NO RUSTING OUT,
NO LEAKY JOINTS,
NO TROUBLE FROM EXPANSION,
NO BACK PRESSURE,
NO OIL IN BOILER.

We guarantee this Heater to be the Most Durable, Effective and Cheapest

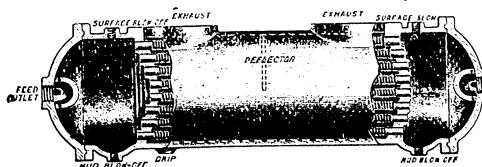
WHITLOCK COIL PIPE CO.,

27 South Street,

Elmwood, Conn.



WAINWRIGHT HEATERS.



This cut illustrates the **HORIZONTAL TYPE** of our **WATER TUBE HEATERS**. Our catalogue contains full information regarding several other styles of Heaters also information in regard to Surface Condensers and Expansion Joints. All of these appliances contain corrugated copper tubing. We shall be glad to correspond with you.

THE TAUNTON (MASS.,) LOCOMOTIVE MFG. CO.

H. S. Walker, 26 W. Randolph St., Chicago, Ill.

W. C. Brown, 68 Cortlandt St., New York, N. Y.

BOOKS

Mechanical AND Steam Engineering.

Complete Practical Machinist.

By JOSHUA ROSE. Embracing lathe work, vise work, drills and drilling, taps and dies, hardening and tempering, the making and use of tools, &c. Fifteenth edition; 356 illustrations; 430 pages.....\$2.50

The American Steam Engineer.

Theoretical and practical, with examples of the latest and most approved American practice in the design and construction of steam engines and boilers of every description. For the use of engineers, machinists, boiler makers and students. By EMORY EDWARDS, M.E. Illustrated by 77 engravings; 419 pages; cloth.....\$2.50

The New Catechism of the Locomotive.

Rewritten and enlarged with new matter and illustrations selected from the latest practice in this country. By M. N. FORNEY; 709 pages; cloth.....\$3.50

Engineers' Sketch Book.

By THOMAS WALTER BARBER, engineer. Nearly 2000 illustrations, descriptive notes and memoranda; 243 pages; cloth.....\$3

Locomotive Engine Running and Management.

A practical treatise on the locomotive engines, showing their performance in running different kinds of trains with economy and dispatch; also directions regarding the care, management and repairs of locomotives and all their connections. Illustrated by numerous engravings. Seventeenth edition. By ANGUS SINCLAIR, M.E. Cloth.....\$2

Stationary Steam Engines.

Especially adapted to electric lighting purposes. Treating of the development of steam engines—the principles of construction and economy, with description of moderate speed and high speed engines. By Prof. R. H. THURSTON. Fourth edition; 177 pages cloth.....\$1.50

Thermo-Dynamics, Heat Motors and Refrigerating Machines

By PROF. DE VOLSON WOOD. Third edition, revised and enlarged; 452 pages; cloth....\$4

Mechanics' and Engineers' Pocket Book.

By CHAS. H. HASWELL. Fifty-fifth edition; 956 pages; leather.....\$4

Manager's Hand-Book of Modern Rules,

Tables and Data for Civil and Mechanical Engineers, Millwrights and Boiler Makers, Tool Makers, Machinists and Metal Worker's Iron and Brass Founders, &c. By W. S. HUTTON. Thick 8vo, half-bound.....\$6

Valve Gears.

Analysis by Zeuner Diagram. By H. W. SPANGLER, P. A. Engr., U. S. Navy; 160 illustrations; cloth.....\$2.50

Sent, post-paid, on receipt of price by

DAVID WILLIAMS,

Publisher and Bookseller,

96-102 READE ST., NEW YORK.

Awarded the Grand Prize at Late Paris Exposition.

SEND FOR THIS BOOK FREE ON APPLICATION.

THE BABCOCK & WILCOX CO. WATER TUBE STEAM BOILERS

30 CORTLANDT ST. N.Y.

BRANCH OFFICES:

- BOSTON, MASS. 8 OLIVER ST.
- PHILADELPHIA, PA. 32 N. 5TH ST.
- PITTSBURGH, PA. 406 LEWIS BLOCK
- CLEVELAND, O. 412 PERRY-PAYNE BLDG.
- CHICAGO, ILL. 45 S. JEFFERSON ST.
- MINNEAPOLIS, MINN. 604 CORN EX.
- NEW ORLEANS, LA. 57 CARondelet ST.
- HAVANA, CUBA. 116 CALLE DE LA HABANA.

MANUFACTORIES IN UNITED STATES, SCOTLAND, FRANCE, GERMANY & AUSTRIA.

R. POOLE & SON CO.
ENGINEERS, FOUNDRERS and MACHINISTS,
BALTIMORE, MD.

MANUFACTURERS AND DESIGNERS OF ALL KINDS OF
HEAVY MACHINERY,
REQUIRING FIRST CLASS WORKMANSHIP AND MATERIALS.

BAND, ROPE and FLY WHEELS, FRICTION CLUTCHES, SHAFTING, PULLEYS and HANGERS.

MACHINE MOLDED AND PLANED GEARING.

MACHINERY for WHITE LEAD and FERTILIZER WORKS,
GRAIN ELEVATORS and FLOUR MILLS, BRASS, COPPER,
and TIN PLATE ROLLING MILLS, CABLE and MARINE RAILWAYS.
POOLE-LEFFEL TURBINE WATER WHEELS.
DREDGING MACHINES.
IRON CASTINGS of 30,000 LBS. TENSILE STRENGTH.

JUST ISSUED.

USES OF COMPRESSED AIR,

By ADDISON C. RAND.

134 PAGES, 94 ILLUSTRATIONS, PRINCIPALLY FROM ORIGINAL PHOTOGRAPHS AND DRAWINGS.

This handy volume is the only comprehensive work upon the uses of compressed air; it is accurate, readably written and beautifully printed upon heavy plate paper. Price \$1.00, post-age paid. Order of the publishers,

THE REPUBLIC PRESS, 14 Lafayette Place, N. Y.,
The Van Nostrand Co., G. P. Putnam's Sons, of N. Y., Damrell, Upham & Co. (the old Corner Book Store), Boston, Mass., Robt. Clarke & Co., Cincinnati, Ohio, The American News Co., and any bookseller.

TOTTEN & HOGG I. & S. F'dry Co.,

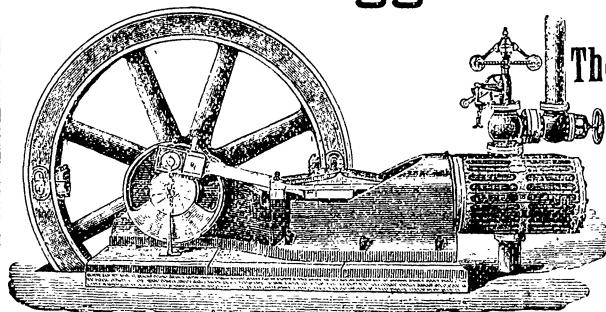
Manufacturers of

The "Aetna" Rolling Mill

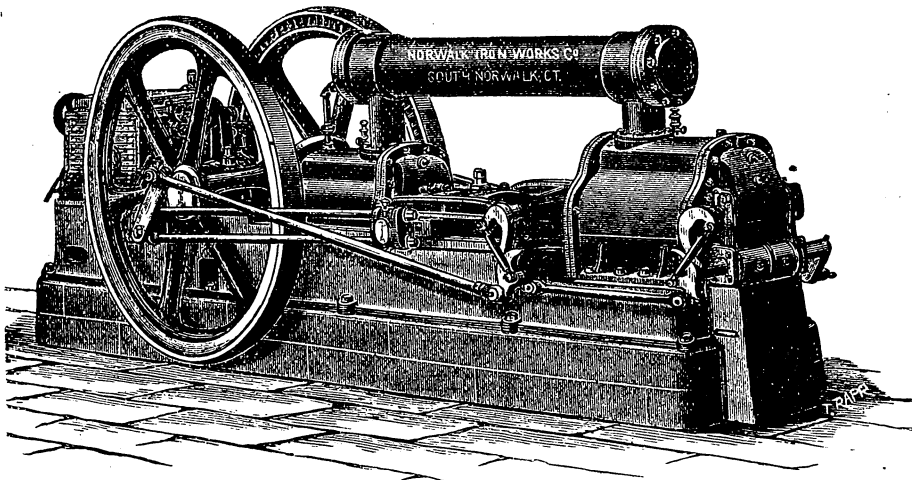
ENGINE

Chilled and Sand
Rolls and Rolling Mill
Machinery,

PITTSBURGH, PA.



Air Compressors.



THE NORWALK IRON WORKS CO., South Norwalk, Conn.

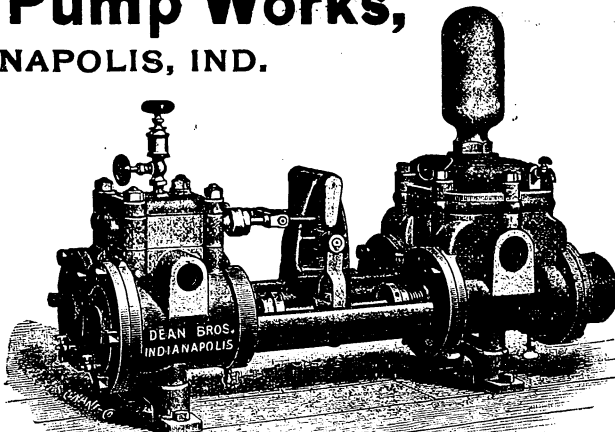
DEAN BROTHERS'
Steam Pump Works,
 INDIANAPOLIS, IND.

DUPLEX PUMPS.

SINGLE PUMPS.

DEEP WELL
 PUMPS.

Send for Catalogue
 and Prices.

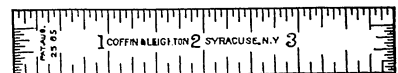
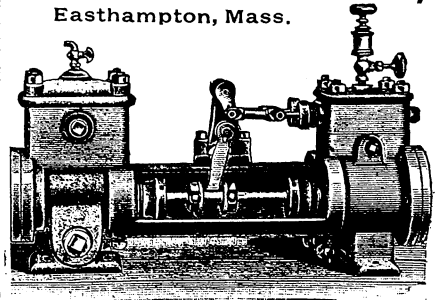


**CHEAPEST.
 HANDIEST.
 SIMPLEST.**

Handling Dirty, Gritty and Sandy Liquids, without Wear, Oil or Care. Pumping outfits for Contractors, Mining, Irrigating, Railroad, Quarry, Drainage and Manufacturing purposes. Second-hand Engines, Boilers, Pumps, and other Machinery always on hand. Exchanging.

MASLINS, 165-167 First St., Jersey City, N.J.

VALLEY PUMPS
 Single and Duplex.
VALLEY PUMP CO.,
 Easthampton, Mass.



MACHINISTS' SCALES,

PATENT END GRADUATION.
 Liberal Discount to the Trade. Send for List.

COFFIN & LEIGHTON, Syracuse; N. Y.

The JOHN H. MCGOWAN CO.

Illustrations of various pumps: RIVAL STEAM PUMP, TWIN LEVER DUPLEX, 1893 SLIDE BOILER FEEDER, TRIPLEX, and DEEP WELL PUMP.

PUMPS FOR EVERY SERVICE **CINCINNATI, OHIO.** **PRICE LIST ON APPLICATION**

FACTORY OFFICE 46 CENTRAL AVE.

Brass Founders and Mfrs. of every description of Brass and Iron body goods for steam, gas and water.

Worthington Steam Pumps
CONDENSERS and WATER METERS.
HENRY R. WORTHINGTON,

NEW YORK, 86 & 88 LIBERTY STREET.

Boston, 70 Kilby St.

Philadelphia, 607 Arch St.

Cleveland, 24 South Water St.

Chicago, 185 to 189 Van Buren St.

St. Louis, Eighth and St. Charles Sts.

The WATERBURY-FARREL FOUNDRY & MACHINE CO., Waterbury, Connecticut,

Builders of Rolling Mill Machinery, Special Machines for finishing and making goods from Sheet Brass, Copper, Steel, Silver, &c. **POWER PRESSES, HYDRAULIC PRESSES, Drop Presses, Foot Presses, RIVET MACHINES, Gang Slitters, Grinding Machines, Steel Rolls, Wire Mill Machinery, Tube Drawing Machinery, Dies, &c.**

A Practical Workshop Companion
 for Tin, Sheet-Iron and
 Copper-Plate Workers. By LEROY J. BLINN
 New revised, enlarged edition, with over 170
 newly engraved illustrations: 296 pages; 12mo,
 cloth.....\$2.50

This deservedly popular book has been thoroughly revised and contains over 100 additional pages, with 170 newly engraved illustrations. The volume contains rules for describing various kinds of Patterns used by Tin, Sheet-Iron and Copper-Plate Workers; Practical Geometry; Mensuration of Surfaces and Solids; Tables of the Weights and Strengths of Metals and other Materials; Tables of Areas and Circumferences of Circles; Composition of Metallic Alloys and Solders, with numerous valuable Receipts and Manipulations for every-day use in the workshop.

Sent, postpaid, on receipt of price, by

DAVID WILLIAMS, Publisher and Bookseller,
 96-102 Reade St., New York.

The Brown Hoisting & Conveying Machine Co.,

CLEVELAND, OHIO, U. S. A.

Complete Systems for Handling of Materials.

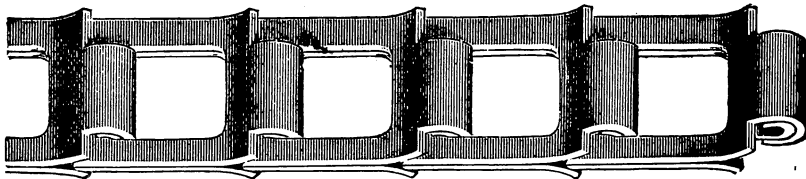
THE BROWN PATENT Bridge Tramway. Shed Tramway. Sewer Machinery Tramway.
Cable Tramway. Warehouse Tramway. Automatic Furnace Hoist.

Traveling Crane for Shipbuilders, a perfect appliance for handling Frames, Armor Plates, etc. The Brown Patent Cantilever Derricks, in use on the Chicago Main Drainage Canal. Working Capacity of Cantilever 500 to 700 yards "solid rock in place" per day of 10 hours. **The Brown Patent Friction Clutch Hoisting Engine.**

Self-Dumping Buckets, Skip Cars, Friction Clutches, etc.

ROBERTS MANUFACTURING CO.,

2100 Smallman Street, PITTSBURGH, PA.



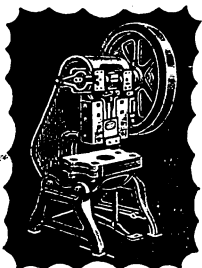
SEND FOR CATALOGUE.

— MANUFACTURERS OF —

Patent Detachable Steel Link Belting, Sprocket Wheels and Shafting, also Malleable Wrought Steel Cable and Special Chains, Elevating, Conveying and Mining Machinery, Wire Rope Haulages and Tramways.

STARK MACHINE & TOOL CO.,

BUFFALO, N. Y.



GENTLEMEN: The dies you made for us are Better than the Average and there are some points about them which are far superior to any dies we ever used.

ALDRICH & RAY MFG. Co.,
Buffalo, N. Y.

PRESS and SPECIAL DIES and TOOLS

MANUFACTURED BY

STARK MACHINE & TOOL CO.,
BUFFALO, N. Y.

JEFFREY CHAIN BELTING.

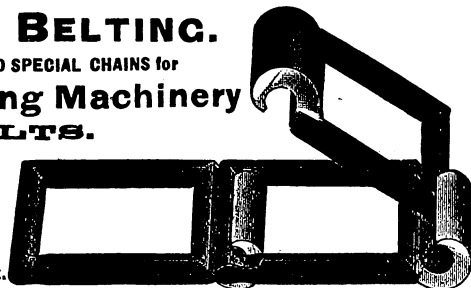
Also MALLEABLE, WROUGHT, STEEL AND SPECIAL CHAINS for
Elevating and Conveying Machinery
DRIVE BELTS.

Send for Illustrated Catalogue and Reduced Price-List.

THE JEFFREY MANUFACTURING CO

COLUMBUS, OHIO, U. S. A.

New York Branch, 163 Washington St.



DURANT COUNTING MACHINES

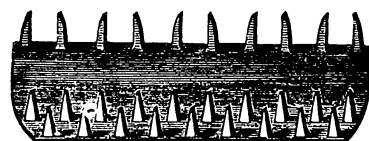
Received the Highest Award at the
World's Columbian Exposition.



Send for
Catalogue
to

W. N. DURANT, 234 22d St., Milwaukee, Wis

Talcott's Combination Belt Hooks.



W. O. TALCOTT, Providence, R. I.
MANUFACTURER OF

Four Styles of BELT HOOKS, Including 134 Sizes.
SEND FOR CATALOGUE.

FOR THE
"Double Triple Quick Stroke"
SHAPER

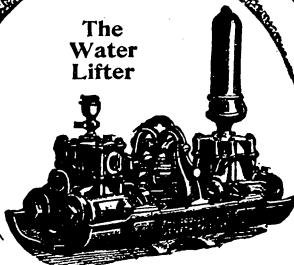
WRITE TO
GOULD & EBERHARDT, Newark, N. J.



18 in. 16 in. 20 in. 24 in. 26 in. 30 in. stroke

GOULDS PUMPS Are Better For Plumbers

The
Water
Lifter



These include

Well Pumps,
Cistern Pumps,
House Force Pumps,
Water Lifters,
Pressure Pumps,
Hydraulic Rams,

Hydrants and Street Washers, &c., &c.

THE GOULDS MANUFACTURING CO.,

Manufacturers of PUMPS and HYDRAULIC MACHINERY,
Works & Main Offices: Seneca Falls, N. Y., U. S. A. Warehouses: 16 Murray St., New York City.

Or Nearest Branch Agency—THE GOULD CO., 22 and 24 North Canal St., Chicago, Ill.

SMITH & WINCHESTER CO., 19 to 37 Wendell St., Boston, Mass. WOODIN & LITTLE, 312 & 314 Market St., San Francisco, Cal.

N. O. NELSON MFG. CO., Eighth & St. Charles Street, St. Louis, Mo. L. M. BATES, 321 Vine Street, Philadelphia, Pa.

FOR TESTING IRON
AND STEEL SPECI-
MENS, CAR COUPLERS,
BRAKE SHOES, CHAIN,
SPRINGS, WIRE, CE-
MENT.

RIEHLE TESTING MACHINES,

Hydraulic Pumps and
Presses, Roble Jacks,
Marble Machinery. Iron
Founders & Machinists.

Richle Bros. Testing
Machine Co.,
9th St. abv. Master Phila

Copyrighted by the Jos. Dixon Crucible Co., Jersey City, N. J., 1893.

GRAPHITE AS A LUBRICANT

SCIENTIFICALLY AND PRACTICALLY CONSIDERED;
ALSO, ITS VALUE AS AN ACCESSORY FOR
ENGINEERS AND MACHINISTS.

*Second Edition, Revised.
1894.*

JOSEPH DIXON CRUCIBLE CO.,
JERSEY CITY, N. J., U. S. A.

To those interested we will send free of charge a 20-p.
pamphlet on this subject of graphite lubrication.

RUBBER GOODS



MOULDED

Small moulded work a specialty.
Send for estimates for moulds and work.

FOR MECHANICAL PURPOSES.

H. O. CANFIELD, Bridgeport, Conn.

PITTSBURGH MFG. CO.,

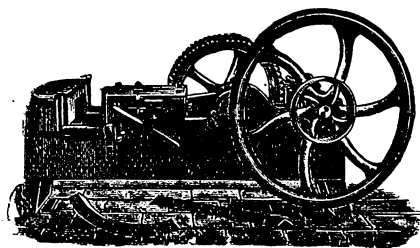
Manufacturers of

Crosgrove's Patent Straight-
ening, Bending and Punch-
ing Machines.

NAIL MACHINERY.

Bolts, Nuts, Rivets, Castings, &c.

PITTSBURGH, PA.



LEVIATHAN BELTING.



Positively un-
equalled for
Strength, Dura-
bility and Trac-
tion Power; un-
affected by Heat,
Steam or Water.

Belts for Main
Driving and work
of a heavy nature
a specialty.

MAIN BELTING
COMPANY,

Sole Manufacturers,
1219-1235 Carpenter St.
PHILADELPHIA.

248 Randolph Street, Chicago.

120 Pearl Street, Boston.

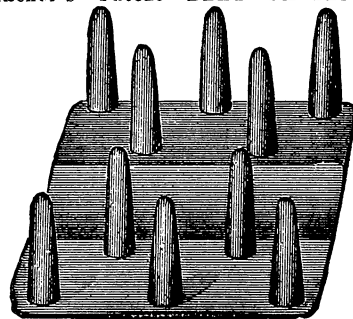
Send for Price-Lists and Samples.

ALEXANDER BROS. BEST OAK BELTING.

PHILADELPHIA.

Patterson, Gottfried & Hunter, Limited, agents,
148-150 Centre St., New York, N. Y.

Thacher's Patent BELT FASTENERS



Manufactured by
The Claffen Manufacturing Co., Cleveland, O.
Office, 71 and 73 Ontario St.

NEW YORK BELTING & PACKING CO. LTD

OLDEST, LARGEST and BEST Makers of

Rubber Goods

FOR MECHANICAL USES.



Rubber belting, hose, steam hose, brewer's hose, suc-
tion hose, "Test" fire hose, cotton hose, packing, valves,
gaskets, rings, vulcanite emery wheels, rubber covered
rolls, tubing, rubber cement, mats, matting, stair treads,
bicycle and vehicle tires, car springs, fruit jar rings, etc.
Special goods to order.



GOOD.



BETTER.

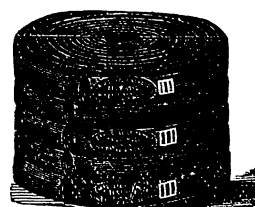


BEST.

Send for Catalogue.

PIONEERS AND LEADERS.

15 Park Row, New York.



STORES: Boston, Philadelphia, Chicago, Cincinnati, Minne-
apolis, Cleveland, San Francisco, Detroit, Baltimore, Charles-
ton, New Orleans, Kansas City, St. Louis, Dallas.

AGENTS WANTED IN UNOCCUPIED TERRITORY.

E. W. BLISS CO.,

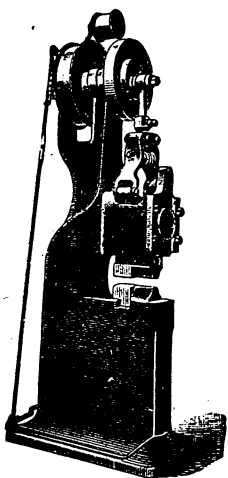
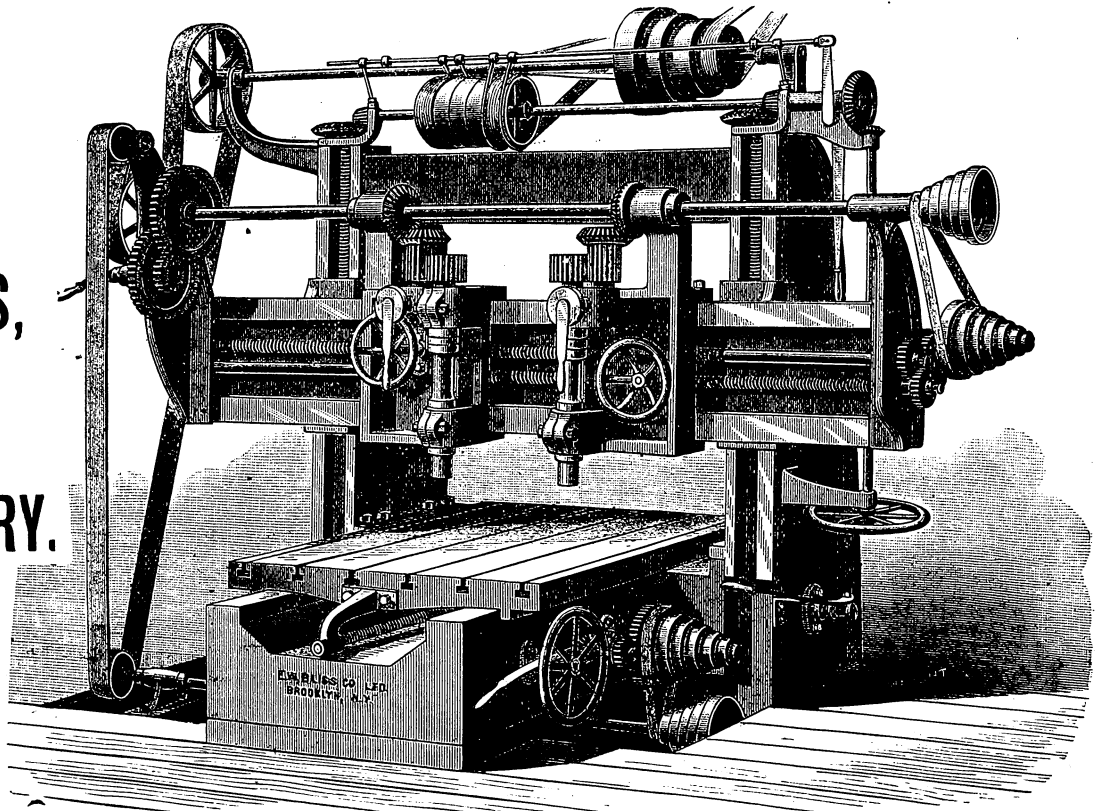
11 ADAMS ST., BROOKLYN, N. Y.
 Western Office,
 100-104 W. Washington St., Chicago.

TWO-SPINDLE MILLING MACHINES

Nos. 220 and 221.

PRESSES,
 PUNCHES,
 SHEARS,
 DROP
 HAMMERS,
 DIES AND
 SPECIAL
 MACHINERY.

THE STILES &
 PARKER
 PRESS CO.



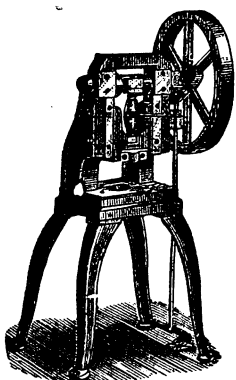
The Dupont Power
 Hammer.

The Dupont Power Hammer

Is the only Power Hammer to buy in hard times, on account of its Low Cost, its Economy of Power, and Perfect Reliability.

Send for Descriptive Circular and Price-List.

The Dupont Manufacturing Co.,
 ST. JOHNSBURY, VT.



A. H. MERRIMAN,
 MERIDEN, CONN.

Manufacturer of all Descriptions of

PRESSES.

Wire Drawing Machines, **WATERBURY**
 Gang Slitters,
 Power Presses and Dies, **MACHINE CO.,**
 Waterbury, Conn.
 MANUFACTURERS.
 Send For Prices.

LINK-BELT

ENGINEERING CO.
NICE TOWN,
P. M.
49 DEY ST.
NEW YORK

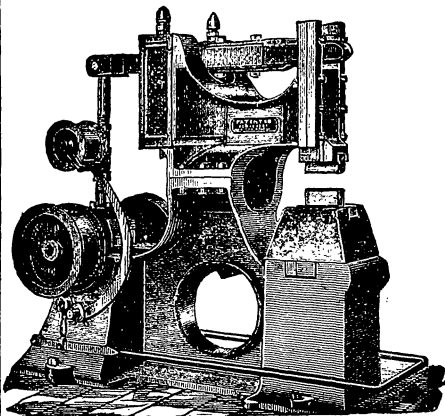
Elevators, Conveyors, Manila Rope Power Transmission Machinery, Ewart Detachable Link Belting, Dodge Chain, Howe Chain, &c.

General Eastern Agents for Fibre-Graphite Journal Bearings for shafting and machines. Require no oil or other lubricant. Moderate in price, durable and guaranteed. Bearings furnished to fit hangers now in use.

WESTERN CONNECTION

[CHICAGO,] LINK BELT MACHINERY CO.

JENKINS' POWER HAMMERS.

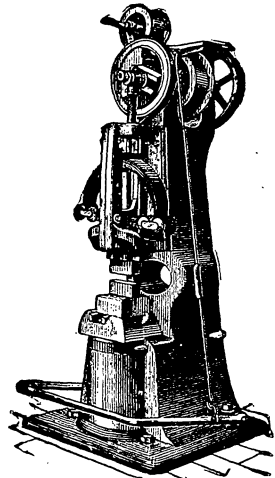


Adjustable and elastic stroke, nicety of regulation, efficiency of action, simplicity and durability of construction and the absence of leather straps, steel springs and all complication, combine to make this hammer the favorite wherever used.

JENKINS & LINGLE,
BELLEFONTE, PA.

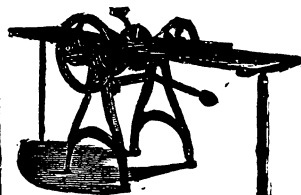
IF YOU USE Power Hammers

Write to us for Circulars.
SCRANTON & CO.,
NEW HAVEN, CONN.



N. Y. Office, 15 Murray St.,
Surplus, Dunn & Alder.
Chicago Office, 60 S. Canal St. H. O. Skinner.
Philadelphia Office, 1113 Arch St.,
Edwin L. McConaughy.

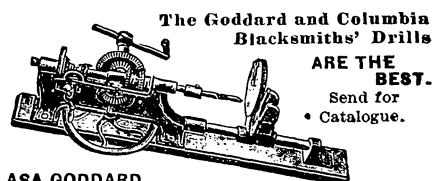
BARNES Hand and Foot Power Machinery, FOR CARPENTERS AND BUILDERS.



Complete Line of Seven Machines. Hand Circular Rip Saw Combined Rip and Cross-Cut Saw (with Scroll Saw and Boring Attachments), Scroll Saw, Former, Mortiser, Tenoner & Lathe

Discounts to the trade on application. Send for Catalogue and Price-List.

W. F. & JOHN BARNES CO.,
69 Ruby Street, ROCKFORD, ILL.
ENGLISH AGENTS, CHAS. CHURCHILL & CO.,
21 Cross Street, Finsbury, E. C., London.



The Goddard and Columbia Blacksmiths' Drills

ARE THE BEST.

Send for Catalogue.

ASA GODDARD
Manufacturer
Worcester, Mass.

SECURE AGENCY NOW!

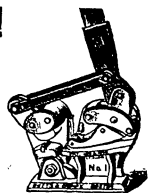
The B. & O. Sure Grip Tire Up-setter is being pushed among Blacksmiths and

IT SELLS.

Every machine is tested and warranted. Send for Price.

HUTTS & ORDWAY,

500 Atlantic Ave., Boston, Mass.



G. ACROS
Manufacture
PRESSE
SPECIAL MA
SHEET METAL
176 178 So. Clinton

BY CO.
S. DIES
CHINERY
WORKERS
Str., Chicago. Ill.

Fitchburg Machine Works,
MANUFACTURERS OF
METAL WORKING MACHINERY
Nos. 13 to 21 MAIN ST.,
FITCHBURG, MASS.

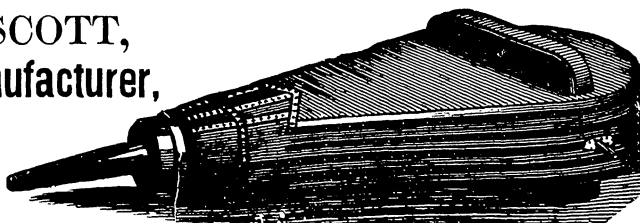
Send for Catalogue B.

GEO. M. SCOTT, Bellows Manufacturer,

Johnson Street

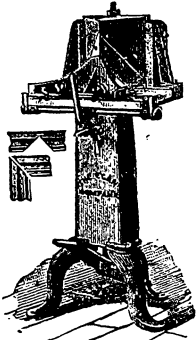
Cor. 22d St.,

CHICAGO, ILL.



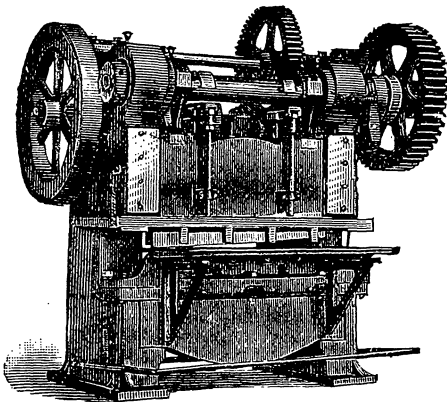
C

DRILL PRESSES
THE LARGEST
VARIETY
SEND FOR NEW
30 PAGE CATALOGUE
JUST OUT
DWIGHT SLATE
MACHINE CO.
HARTFORD CONN



Foot Power Miterer
and Jointer.

THE EGAN CO.,
179 to 199 W. Front St.,
CINCINNATI, OHIO, U. S. A.
MAKERS OF
**WOOD-WORKING
MACHINERY**
FOR ANY PURPOSE.
Highest honors World's Fair



GATE SHEAR.

THE LONG & ALLSTATTER CO.,
HAMILTON, OHIO, U. S. A.
MANUFACTURERS OF

Belt, Steam and Electrically Driven
Power Punches and Shears.



OUR ADJUSTABLE STOCKS AND DIES
are universally acknowledged to be the **BEST!** We
also make all our Tools on the same principle of the
Best Material and Workmanship, and always
with a view of *time and labor saving in their use.*

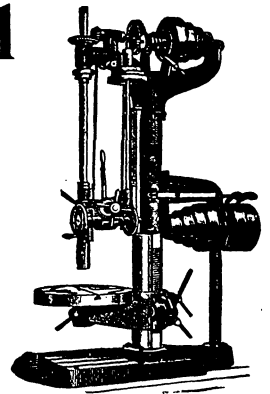
The Practical Catechism. A collection of questions on technical subjects, by manufacturers and others, and of answers thereto. By **ROBERT GRIMSHAW, M.E., Ph.D.** Treating of Miscellaneous engineering questions, and touching upon physical science, chemistry, etc. **GENERAL TOPICS:** Properties of Air; Alloys; Beams; Belts; Bricks; Building; Building Stones; Calculations; Cements; Chemical Processes; Coloring Metallic Objects; Combustion; Disinfectants; Fastenings; Fluxes; Foods; Foundry Practice; Fuels; Gas; Gear Wheels; Gravity; Hardening; Tempering and Annealing; Heating; Hydraulics; Iron and Steel; Limes, Mortars and Cements; Locomotives; Lubrications; Mechanical Processes; Metals in General; Millwrighting; Paints; Oils and Varnishes; Plants; Power; Railways; Ropes; Saws; Shafting; Solders; Strength of Materials; Sugars; Temperatures; Timber and Trees; Ventilation; Waters; Weights; Wines; Work Miscellaneous. 297 pages, cloth.....\$1.25

For Sale by **DAVID WILLIAMS, 96-102 Reade St., N.Y.**

A Burglar's Drill

is as unlike this in appearance as is the resemblance of a fine watch to a cheap 8 day clock, but the burglar's tool has many fine points. So has this. Write for particulars.

THE HAMILTON MACHINE TOOL COMPANY,
WEST MARKET STREET,
Hamilton, - Ohio, U. S. A.
Western Store, 57 So. Canal St., Chicago.



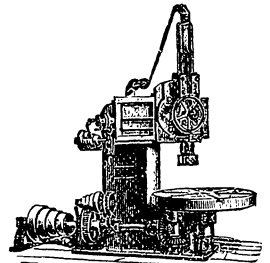
A Modern Machine ★

Shop to compete with others **MUST USE** modern machinery. We are in the business of producing such, and invite correspondence as to details, prices, etc., etc.



BICKFORD DRILL & TOOL CO.,

BUILDERS OF UPRIGHT, RADIAL AND UNIVERSAL DRILLS, ETC.
10 Lawrence St., CINCINNATI, O.



MACHINERY FOR STONE WORKING.

LINCOLN IRON WORKS,
RUTLAND, VT.

New York Office, 182 Front Street

Stone Working Machinery, Planers, Gang Saws, Rubbing Beds, Derricks and Hoisting Powers, also Gear Castings. See list.

WE MAKE —

Cutting-off Machines embodying all the latest improvements and which prove themselves the best and most economical machines in the market. You cannot afford to use a poor machine in these hard times. Our Cone Driven Machine has two tools taking a shearing cut and doing double the work of any one tool machine ever made. The Accelerated Speed Machine has the same arrangement but in addition the speed is accelerated as the tools approach the center. These machines have proved in the shop that they will do double the work per day that even our Cone Driven Machine can. Perhaps you would like to know more about them. Just ask us, that's all.

HURLBUT-ROGERS MACHINE CO., South Sudbury, Mass.

—PULVERIZE—PULVERIZE—PULVERIZE—

THE GRIFFIN MILL

The only perfect Pulverizer of Quartz, Gold or Silver Ores, Portland Cement, Phosphate Rock, Foundry Facings and all other Refractory Substances. Will work wet or dry. Correspondence solicited. Illustrated pamphlet free.

BRADLEY FERTILIZER CO.,

92 STATE STREET, - BOSTON, MASS.

—PULVERIZE—PULVERIZE—PULVERIZE—

BEMENT, MILES & CO.,PHILADELPHIA, PA.
MANUFACTURERS OF**METAL-WORKING MACHINE TOOLS**

FOR
 Railroad Shops,
 Locomotive and Car Builders,
 Machine Shops,
 Rolling Mills,
 Steam Forges,
 Ship Yards,
 Boiler Shops,
 Bridge Works,
 etc., etc.

**Steam Hammers,
 Steam and Hydraulic Riveting Machines.**

Sturtevant Forges.

**THE STURTEVANT
PORTABLE FORGES**
 ALL SIZES & STYLES
 SEND FOR CATALOGUES TO
B. STURTEVANT © BOSTON
 MASS.
 NEW YORK, PHILADELPHIA, CHICAGO, LONDON.


SOMETHING NEW.**The "M. & P." Friction Drop Hammer.**

Entirely New Principle for Working the Rolls. Positive and Quick
 Action. Strong and Durable.

NO BOLTS OR NUTS ON LIFTER
 TO JAR LOOSE.

Miner & Peck Mfg. Co., New Haven, Ct.

Engravings Show the Style of Die
 Head which the

Bignall & Keeler Mfg. Co.,

ST. LOUIS, MO.,

PLACE ON THEIR

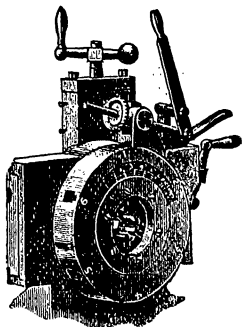
PEERLESS AND DUPLEX

Pipe Threading & Cutting Machines.

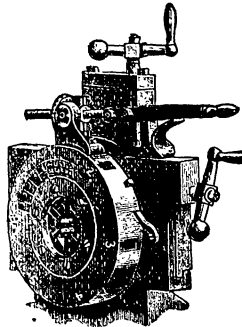
Write for Prices on the

Most Perfect and Economical Line
 of Machines on the Market.

Mention *The Iron Age*.



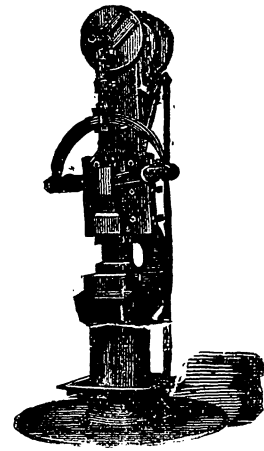
"Peerless" Head showing
 dies expanded



"Peerless" Head showing
 dies closed.

DEAD-STROKE POWER HAMMERS.

CONSTRUCTION IMPROVED.
 Prices Reduced.
 Seven Sizes.
 5 to 250 Pounds.



The 15 and 25 pound sizes are specially adapted
 to 'Milemakers' use, the other sizes for general
 forging. Send for circular and references.

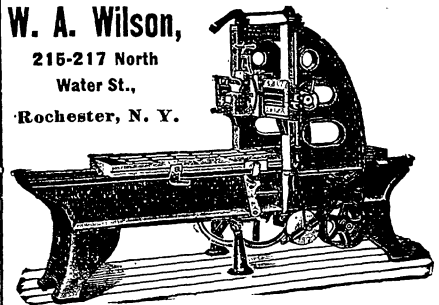
**DIENELT & EISENHARDT,
 MAKERS,**

1310 Howard St., Philadelphia.

W. A. Wilson,

215-217 North
 Water St.,

Rochester, N. Y.



Improved Iron Planers a specialty. 20 x 20, 22 x 22,
 24 x 24 up to 42 x 42, to plane any length. Send for
 description and price-list before purchasing. Manu-
 facturers' agent for other tools and machinery. Men-
 tion *The Iron Age*.

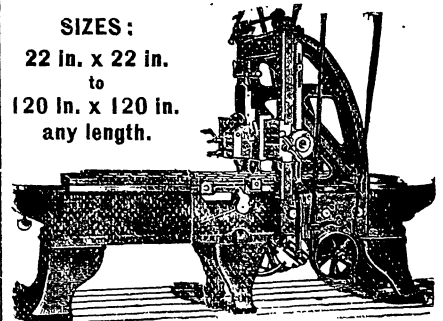
THE POWELL PLANER CO.

SIZES:

22 in. x 22 in.

to

120 in. x 120 in.
 any length.



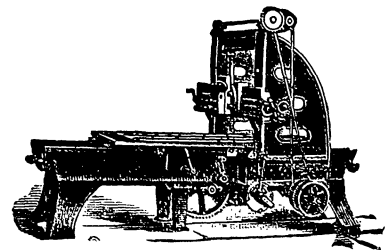
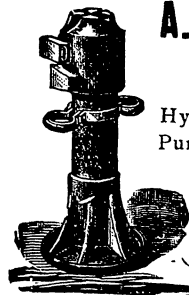
WORCESTER, MASS.

A. L. HENDERER,

Wilmington, Del.

MANUFACTURER OF

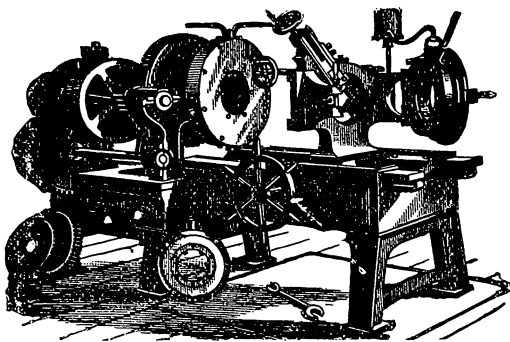
Hydraulic Jacks, Hydraulic
 Punches, Screw Punches,
 Steel Tube Expand-
 ers, Flue Hole Cut-
 ters, Boiler Test
 Pumps and Pipe
 Vises.



NEW HAVEN MANUFACTURING CO.,
 NEW HAVEN, CONN.,

Manufacturers of

IRON-WORKING MACHINERY



D. SAUNDERS' SONS,

—MANUFACTURERS OF—

Pipe Cutting and Threading Machines

For Pipe-Mill and Steam Fitters Use. Tapping Machines for Steam Fitting. Also Steam and Gas Fitters' Hand Tools.

—SEND FOR CIRCULARS.—

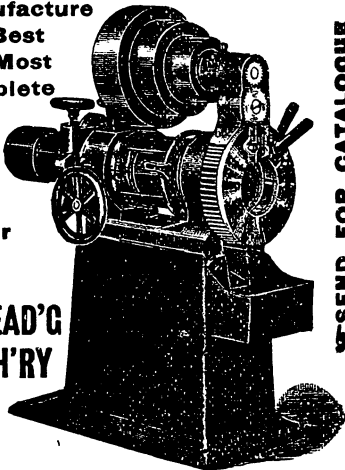
No. 25 Atherton Street, - YONKERS, N. Y.

The Merrill Manufacturing Co.,
TOLEDO, O.

Manufacture
The Best
and Most
Complete
Line
of

Hand
and
Power

PIPE
THREAD'G
MACH'RY
IN
USE.



SEND FOR CATALOGUE

HYDRAULIC JACKS.

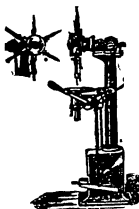
ALL SIZES. ALL STYLES. ALL WARRANTED.

HYDRAULIC PRESSES,

PUMPS, ACCUMULATORS, VALVES, GAUGES, FITTINGS, &c.

SEND FOR CATALOGUE E.

WATSON & STILLMAN, - 204-210 E. 43d St., New York.

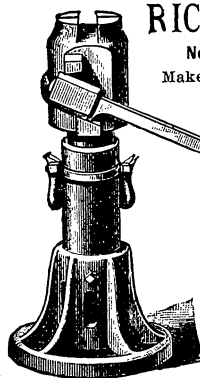


QUINT'S TURRET DRILLS.

No. 2 Pattern.

This machine is made with from 2 to 12 spindles. All spindles driven direct by bevel gears. Only the spindle in use revolves. Will drill up to 3/4 inch. Address

A. D. QUINT, Hartford, Conn.



RICHARD DUDGEON,

No. 24 Columbia St., New York,
Maker and Patentee of the Improved

HYDRAULIC JACKS

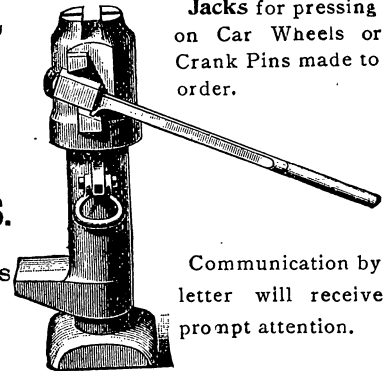
AND

PUNCHES.

Roller Tube Expanders

and Direct Acting

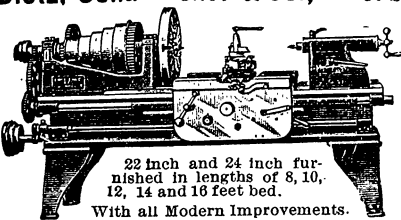
Steam Hammers.



Jacks for pressing
on Car Wheels or
Crank Pins made to
order.

Communication by
letter will receive
prompt attention.

Dietz, Schumacher & Co., Cincinnati, Ohio,
U. S. A.



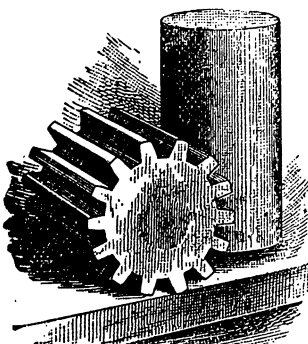
22 inch and 24 inch fur-
nished in lengths of 8, 10,
12, 14 and 16 feet bed.
With all Modern Improvements.

Machinery Builders using Lathes, and
desiring something unique
in the way of

Eng. Lathes,

should write to us
for descriptive matter and details.
We also make a splendid line of Radial Drills.

HYDRAULIC FORGING.



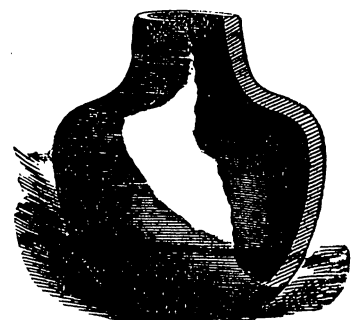
Billet and Patent Hot-Pressed
Steel Pinion.

Steel Bottles, Air and Gas Receivers
drawn from Solid Steel or Plates,
Crank Shafts, Straps, Wrists, Pins,
Irregular Shapes, Discs, Cups,
Boiler Heads, Steel Flanges
for High Pressure Steam,
Drawn Steel Tubing for Bi-
cycles, Boilers, Etc.

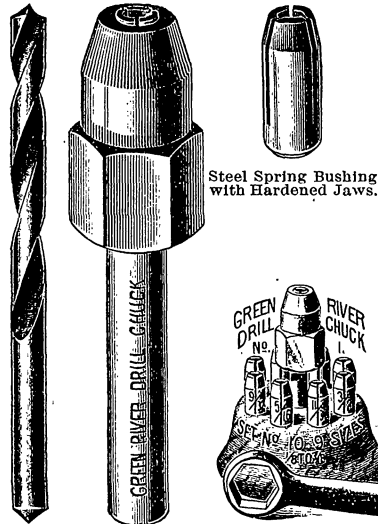
THE UNITED STATES PROJECTILE CO.,

1st Ave. and 53d St., Brooklyn, N. Y.

CORRESPONDENCE SOLICITED



Steel Bottles, any thickness or shape.

NEW GREEN RIVER DRILL CHUCK,

With Steel Spring Bushings.

Accurate and Strong, Holding Chucks, Gripping and Centering to Perfection.

—MAKERS ALSO OF THE—

Celebrated "Lightning" and "Green River" Brands of Taps Dies, Screw Pates, Reamers, Bolt-Cutting and Nut-Tapping Machines, Drill Presses, Etc., Etc.

Send for New Catalogue of 168 pages

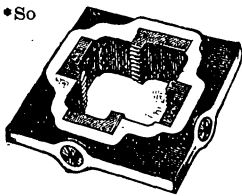
Wiley & Russell Mfg. Co.,

Greenfield, Mass., U. S. A.

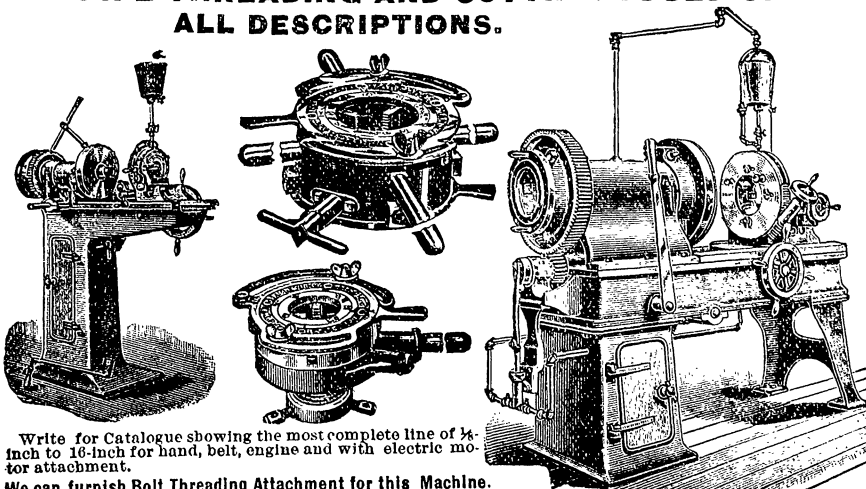
New York Agency for Wiley & Russell, 120 Liberty St.

Don't Buy***Maule's "Skeleton" Pipe Die****If You Wish to Avoid****A Pipe-Threading Die** extremely easy of operation by reason of the **proper clearance** of its cutters;**Of surpassing durability** secured by the accurate and uniform temper of said Cutters;**Having Cutters** that when dull may be removed in a moment, and **sharpened on a grindstone or emery wheel**;**Of phenomenal cheapness**, arising from small first cost coupled to excellence of quality.**If by chance you do not think these points, or the saving of money, objectionable,**

*So

Send us a Postal Note for 62 Cents (do not send us any postage stamps), and we will mail you a sample **one-inch Die**, either $2\frac{3}{8}$ or $2\frac{1}{2} \times \frac{3}{4}$ thick, which we hereby agree to take back if not to your satisfaction.**HENRY B. PANCOAST & CO.,**
PHILADELPHIA, U. S. A.

Send for Catalogue of the "Skeleton" Pipe Die

JARECKI MFC. CO. (Limited), Erie, Pa.**PIPE THREADING AND CUTTING TOOLS OF ALL DESCRIPTIONS.**Write for Catalogue showing the most complete line of $\frac{1}{4}$ -inch to 16-inch for hand, belt, engine and with electric motor attachment.
We can furnish Bolt Threading Attachment for this Machine.**BOOKS**

—ON—

Mechanical and Steam Engineering.**The Slide Valve Practically explained.**

Embracing simple and complete practical demonstrations of the operation of each element in a slide-valve movement, and illustrating the effects of variations in their proportions by examples carefully selected from the most recent and successful practice. By JOSHUA ROSE, M. E. Illustrated by 35 engravings; 100 pages; cloth.....\$1

Twenty Years with the Indicator.

Being a practical text book for the engineer or the student, with no complex formulae. By THOMAS PRAY, JR., consulting, constructing, civil and mechanical engineer, &c. Newly arranged; complete in one volume; 284 pages; cloth.....\$2.50

A Treatise on Belts and Pulleys

Embracing full explanations on fundamental principles, proper disposition of pulleys, rules for determining widths of leather and vulcanized rubber belts and belts running over covered pulleys; strength and proportions of pulleys, drums, &c.; together with the principles and necessary rules for rope gearing and transmission of power by means of metallic cables. By J. HOWARD CROMWELL, Ph. B., author of a Treatise on Toothed Gearing; 271 pages; cloth...\$1.50

Modern Steam Engines.

An elementary treatise upon the steam engine, written in plain language, for use in the workshop, as well as in the drawing office, giving full explanations of the construction of modern steam engines, including diagrams, showing their actual operation; together with complete but simple explanations of the operations of various kinds of valves, valve motions and link motions, &c., thereby enabling the ordinary engineer to clearly understand the principles involved in their construction and use, and to plot out their movements upon the drawing board. By JOSHUA ROSE, M. E. Illustrated by 422 engravings; 321 pages, 10 x 12 inches; cloth.....\$6

Richards' Steam Engine Indicator.

A treatise on the development and application of force in the steam engine. Fourth edition, revised and enlarged. By C. T. PORTER. 273 pages; 20 plates; cloth.....\$3

A Manual of Steam Boilers,

their designs, construction and operation. For technical schools and engineers. By PROF. R. H. THURSTON. Second edition; 183 engravings in text; 671 pages; cloth..\$5

The English and American Mechanic.

An every-day handbook for the workshop and factory, containing several thousand receipts, rules and tables indispensable to the mechanic, the artisan and the manufacturer. By B. FRANK VAN CLEVE. A new enlarged edition by EMORY EDWARDS, M. E. 476 pages, illustrated; cloth.....\$2

Any Book published sent, post-paid, upon receipt of price, by

DAVID WILLIAMS,

Publisher and Bookseller,

96 - 102 Reade St., New York.

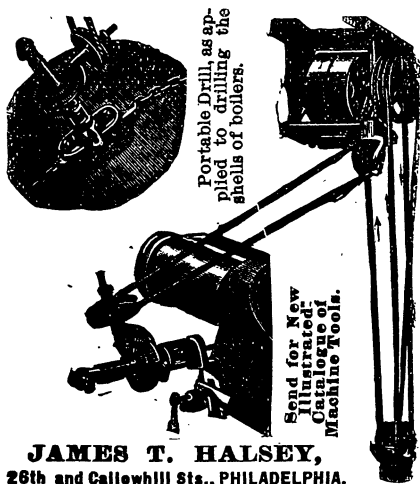
FRICITION CLUTCHES, SHAFTING, HANGERS, PULLEYS.

Sheaves for Rope Driving.
Gear Wheels.

FRICITION PULLEYS.

KEYSTONE CLUTCH AND MACHINE WORKS,

1708-1710 Germantown Ave.,
PHILADELPHIA, PA.



JAMES T. HALSEY,
26th and Callowhill Sts., PHILADELPHIA.

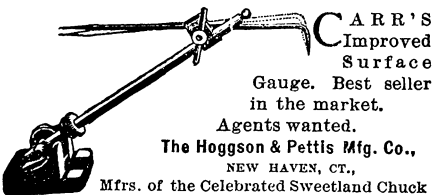
Portable Drilling and Tapping Machines.

ALBERT M. COLBURN,
Wall St., New Haven, Conn.
Send for New No. 4 Catalogue.

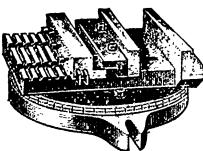
REECE'S PATENT HAND BOLT CUTTER OR SCREW PLATE.



Send for new catalogue of
SCREW CUTTING TOOLS.
EDWARD F. REECE, Mfr., GREENFIELD, MASS.



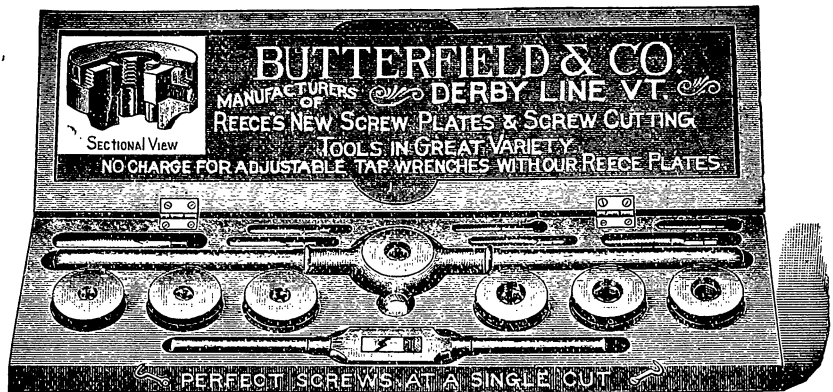
SKINNER PATENT CHUCKS.



Independent Lathe Chucks.
Universal Lathe Chucks.
Combination Lathe Chucks.
Lathe Chucks with Patent
Reversible Jaws. Planer
Chucks, Drill Chucks, Face-
Plate Jaws, &c.
THE SKINNER CHUCK CO.,
New Britain, Conn., U. S. A.



CHUCKS The National!
All sizes and styles Patented
Reversible Jaws. Illus. catalogue.
The standard Chuck since 1882.
Address **W. WHITLOCK,**
39 Cortlandt Street, New York.



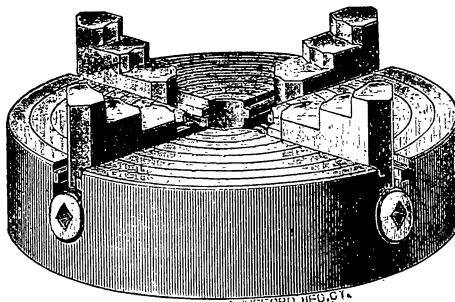
"CUSHMAN" CHUCKS.

For Lathes, Drills, Chucking and Screw Machines, and
for special use.

SEND FOR CATALOGUE.

The Cushman Chuck Co.,
Hartford, Conn.

CHAMPION INDEPENDENT CHUCKS.



An entirely new line of small
Chucks, provided with 3 or 4 inde-
pendent reversible steel jaws. The
best Chuck in the market for foot
lathes. Ask your dealer for them
or write to us.

THE D. E. WHITON MACHINE CO.

Sole European Agents, SELIG SONNENTHAL & CO., LONDON.

New London, Conn.



Three styles of Screw Plates **BUILT EN-
TIRELY ON HONOR**, with prices to suit all.
Write for catalogue.

CHAMPION BLOWER & FORCE CO., - - LANCASTER, PA.



THE ADJUSTABLE
"DUPLEX" DIE STOCK.

Quick. Accurate. Durable.
15,000 now in use.

HART MANUFACTURING CO.,

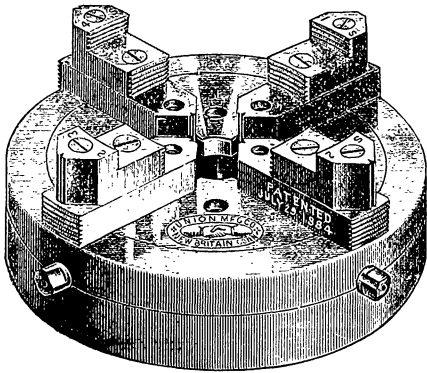
CLEVELAND O. U. S. A.



UNION MANUFACTURING COMPANY, NEW BRITAIN, CONN.

WAREHOUSE, 103 CHAMBERS ST., NEW YORK.

Manufacturers of Combination Chucks, Universal Chucks, Independent Chucks, Combination Reversible Jaw Chucks, Car Wheel Chucks, &c., &c.

**Union Chuck No. 21**

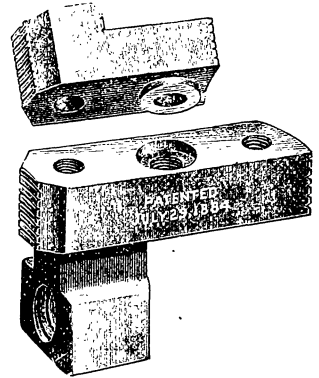
Combination with Reversible Jaws.

ALSO

Showing Sectional Cut of Jaw.

We guarantee our Chucks in every particular.

WRITE FOR CATALOGUE AND PRICE-LIST.

**Machinery Pattern Making**

CONTAINING

FULL SIZE PROFILES OF GEAR TEETH
AND FINE ENGRAVINGS ON FULL-PAGE
PLATES, ILLUSTRATING MANNER OF
CONSTRUCTING NUMEROUS AND
IMPORTANT PATTERNS AND
CORE BOXES.

By **P. S. DINGEY,**

Practical Pattern Maker and Mechanical Draftsman

376 Fine Illustrations: 12mo, cloth, \$2.

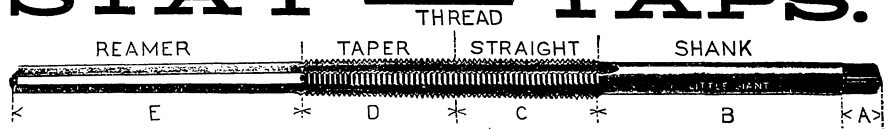
CONTENTS.

The Pattern Maker and His Trade.
The Pattern Shop—Its Position, Size and Requirements.
Marking and Recording Patterns.
Printing-Press Cylinders.
Differential Chain Pulleys.
A Handy Tool for Laying out Hexagon Nuts.
How to Cast Journal Boxes on Frames.
How to Strike an Arc by the Aid of Three Points.
Key-Heads for Motion Rods—The way to lessen the cost of their production.
Elbow and Tee Pipes—A quick method for turning the patterns and core boxes in the Lathe.
Slide-Valve Cylinders.
Corliss Cylinders—With a full description, showing how to construct patterns and core-boxes which can be changed at short notice for different stroke engines.
Fly Wheels—Different styles.
Engine Frames—How to build the pattern to serve for various strokes.
Spur Gears—How the teeth should be made.
Bevel Gears—The manner of laying them out.
How to Lay Out the Thread of a Worm for the Pattern.
Worm Wheels—The way to get the angle of teeth and the manner of fastening them on.
Sweeping Straight Winding Drums.
Making Winding Drums from Patterns.
Making Sheaves from Core Boxes.
Making Sheaves from Patterns.
Sheaves with Wrought-Iron Arms—An original way of making the Hub.
A Machine for Sweeping Conical Drums—Designed by the author.
Gear Teeth—One hundred and Twenty-eight full size different profiles of Gear Teeth from 1" to 3" Pitch, suitable for gears having from 14 to 800 teeth.
Table showing at a glance the required diameters of Gear Wheels for a given number of teeth and pitch.
Weight of Cast-Iron Pipe.
" " Cast-Iron Balls.
" " Round Cast Iron.
" " Square Cast Iron.
" " Flat Cast Iron.
" " Superficial Foot of Cast Iron from 1/4" to 2" thick.
" " Round lead.
" " Square lead.
Binary and Decimal Fractions
Table which gives distances to open a 2-ft. rule for obtaining angles from 1° to 90°
Metric Measure reduced to inches.

Sent, Postpaid, on receipt of price, by

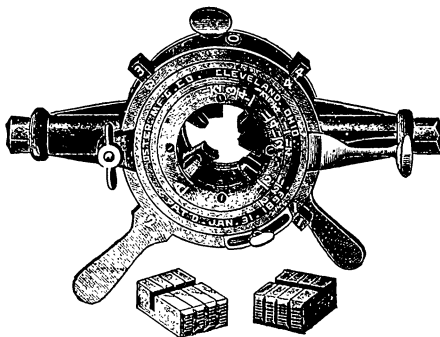
DAVID WILLIAMS, Bookseller & Publisher,

96-102 Reade Street, New York.

**STAY BOLT TAPS.**

We Make a Specialty of this Style of Tap:

CUT THIS OUT, mark
Description of TAPS
used and send to us
for prices.

WELLS BROS. & CO., GREENFIELD, MASS., U. S. A.

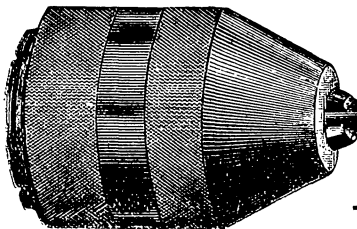
The Oster Patent Adjustable Die Stocks,
with Patent Adjustable Positive Stop
and Cut-Off,

Are built, sold and warranted as the best
hand tools for threading and cutting off pipe.
They are complete in themselves; no hammer,
wrench or other tools required. They are easier
to operate, have less weight, more strength
and do a larger range of work and more of
it in a given time than any in the market.
They have all the merits of perfect tools in material,
construction and finish. They are furnished
at popular prices by wholesale
dealers throughout the world. Boxed singly
with full printed instructions.

Write for Prices and Discounts to

The Oster Mfg. Co.,

CLEVELAND, OHIO, U. S. A.

**THE NEW GIANT DRILL CHUCK.**

Holds a Drill With the Grip of a Giant. All Steel

Parts Interchangeable.

SIMPLE IN CONSTRUCTION.

EASY TO TAKE APART AND CLEAN. BEST OF WORKMANSHIP AND VERY CHEAP. Manufactured and sold by

THE SMITH & EGGE MFG. CO., Bridgeport, Conn**Sigourney Tool Company, INTERCHANGEABLE MACHINERY**

A SPECIALTY.

Drill Presses, Automatic Gear Cutters, Typewriters, Book
Sewing Machinery, Electrical Goods, Dies, Punches, Drill
Jigs, Models and special work of all kinds built
by day or contract.

HARTFORD,**CONN.**

THE STANDARD TOOL CO., CLEVELAND, OHIO.

MANUFACTURERS OF

Increase Twist Drills, Reamers, Taps, Milling Cutters and Chucks.

Taper Shank
Drills,
St. Shank Drills,
Screw-driver
Bits,
Reamers,
Shell and Solid
Taper Reamers.



Bit Stock Drills for Metal or Wood.



Wood-Boring Brace Drills, will cut off nails.

Hand Taps,
Mach. Screw Taps
"Standard" Drill
Chuck,
"Ellenwood" Drill
Chuck,
Sq. Shank Drills
for Ratchets,
Twist Drills for
Blacksmiths'
Presses

Sockets for
Taper Shank
Drills.Reamers in
all sizes.

NEW YORK OFFICE, 33 CHAMBERS ST. Send for Catalogue.

1874.

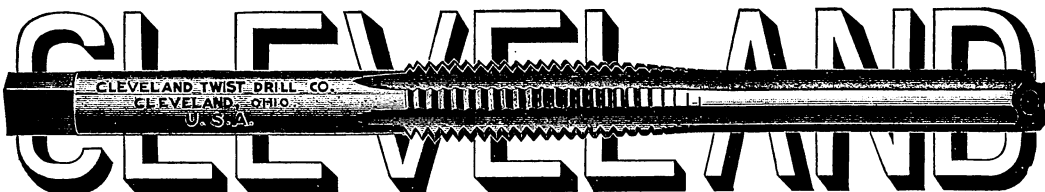
OLD RELIABLE.

1894.

SEND

FOR

CATALOGUE.



WRITE

FOR

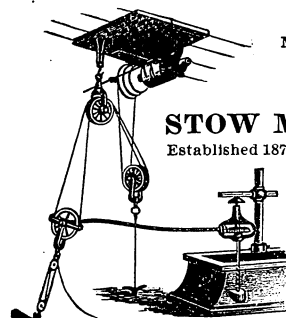
DISCOUNTS.

Our Drills are Hot Forged. The best part of the steel IS NOT CUT OUT and thrown away.



They are TOUGHER, STRONGER, BETTER than is possible to attain by milling. Catalogue and Discounts sent on application.

STOW FLEXIBLE SHAFT,

Invented and
Manufactured by

THE

STOW MFG. CO.,

Established 1875. Binghamton,

N. Y.

PORTABLE,

DRILLING,

TAPPING,

REAMING.

General European Agents,

SELIG SONNENTHAL & CO.,

85 Queen Victoria St.,

LONDON, ENGLAND.

MORSE TWIST DRILL & MCH. CO.,



DRILLS, REAMERS, CUTTERS,



BEACH CHUCKS, TAPS, DIES.



Factory, NEW BEDFORD, MASS.

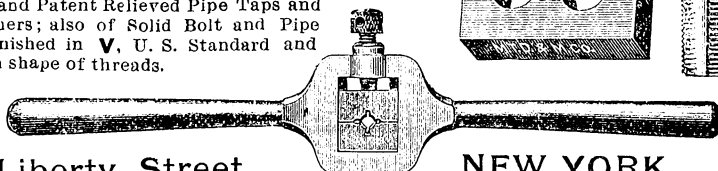
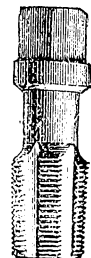
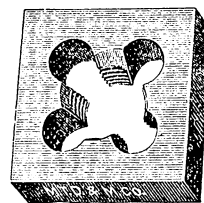
Catalogues on application.

MANNING, MAXWELL & MOORE,

Sole Sales Agents for THE MORSE TWIST DRILL AND MACHINE CO'S



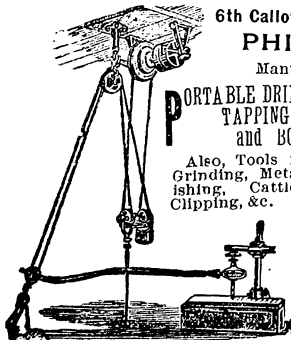
Manufacture of Patent Machine Relieved Nut, Hand,
Blacksmith and Machine Screw Taps, Screw Plates, Tap
Wrenches and Patent Relieved Pipe Taps and
Pipe Reamers; also of Solid Bolt and Pipe
Dies. Furnished in V, U. S. Standard and
Whitworth shape of threads.



111 Liberty Street,

NEW YORK.

Stow Flexible Shaft Co., Limited.



6th Callowhill & Biddle Sts.,

PHILA., PA.,

Manufacturers of

PORTABLE DRILLING,
TAPPING, REAMING,
and BORING MACHINES

Also, Tools for Emery Wheel
Grinding, Metal and Wood Pol-
ishing, Cattle Brushing and
Clipping, &c.

Gen'l European
Agents,

Boiling & Lowe,

2 Lawrence

Peuntney Hill,

LONDON, ENG:

Penn Elevator Engineering Co..

WORKS:
BLOOMSBURG, PA.

PHILADELPHIA

OFFICE:

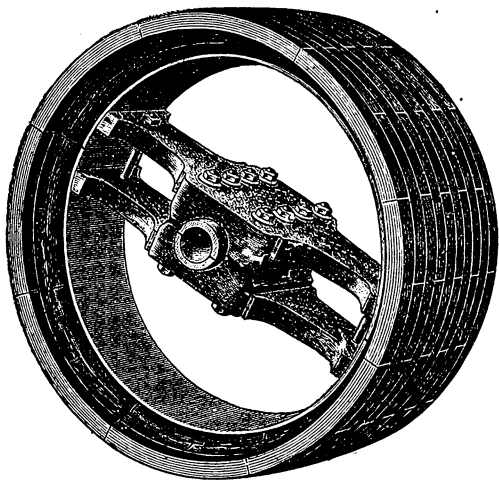
516 COMMERCE ST.

MANUFACTURERS
AND BUILDERS

Hydraulic and Direct Electric Passenger and Freight Elevators.
Steam, Belt and Hand Power Elevators of every description,

With Automatic Doors or Gates.

ELEVATORS



STRICTLY HIGH GRADE. INDEPENDENCE WOOD SPLIT PULLEY,

With Patent Bushing System.

THE ORIGINAL AND BEST. OVER ONE MILLION IN USE.

Sales Agencies in all the Leading Cities of the World.

SEND FOR CATALOGUE AND PRICE-LIST.

DODGE MANUFACTURING CO., MISHAWAKA, IND.

NEW YORK BRANCH and Distributing Depot, 43 and 45 Dey Street.

CHICAGO BRANCH, 166-174 S. Clinton St.

BOSTON BRANCH, 126 Pearl St., Opened June 1st.

LARGE STOCKS at BRANCH HOUSES and at WORKS.

(ESTABLISHED 1854.)

A. & F. BROWN,

Engineers, Founders and Machinists.

SHAFTING,

PULLEYS, HANGERS, ETC.

FRICTION CLUTCHES.

Estimates and Plans furnished for transmitting power by

HORIZONTAL AND VERTICAL SHAFTING

Also for erecting same.

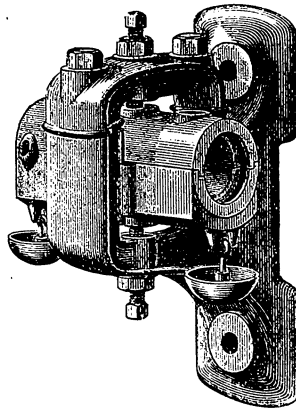
STEAM SIRENS

—FOR—

Lighthouse, Steamship, Factory and Fire Signals.

SEND FOR CATALOGUE.

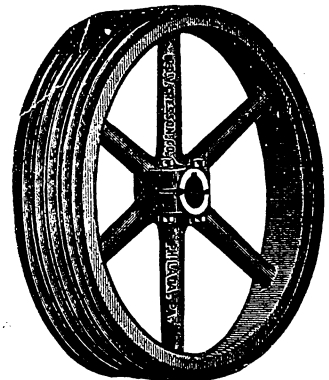
17 DEY ST., - - - NEW YORK.



GEO. V. CRESSON CO.,

18th STREET AND ALLEGHENY AVE.

PHILADELPHIA, PA.



ROPE WHEELS,

All Diameters and Number of Grooves, for Manilla, Hemp, Cotton, or Leather Ropes.

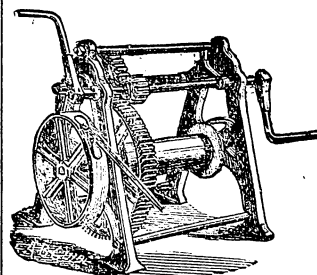
BUSINESS ESTABLISHED
1798.

INCORPORATED
1801.

JOS. F. MCCOY CO.,

26 Warren St., New York,

HEADQUARTERS FOR



Hoisting

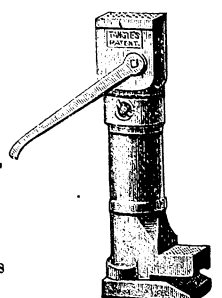
Crabs,

ALL IRON.

SIZES:
½ ton to 70 tons.

**Tangye's
Hydraulic
Jacks.**

SIZES:
4 tons to 200 tons. Lifts
on foot or top.



JOHN ADT & SON,

New Haven, Conn.

BUILDERS of MACHINERY for HARDWARE MANUFACTURE.

BUTT MILLING MACHINERY,

BUTT DRILLING MACHINERY,

RIVETING MACHINES,

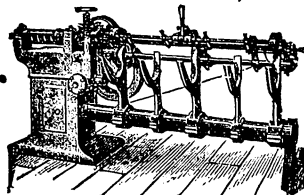
WIRE STRAIGHTENING

MACHINERY,

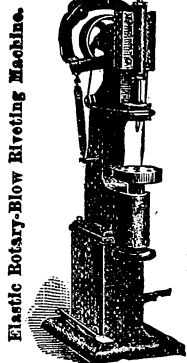
FOOT PRESSES,

SPRUE CUTTERS,

ETC.



Automatic Wire Straightening and Cutting Machine



Elastic Rotary-Blow Riveting Machine

A Treatise on Belts and Pulleys.

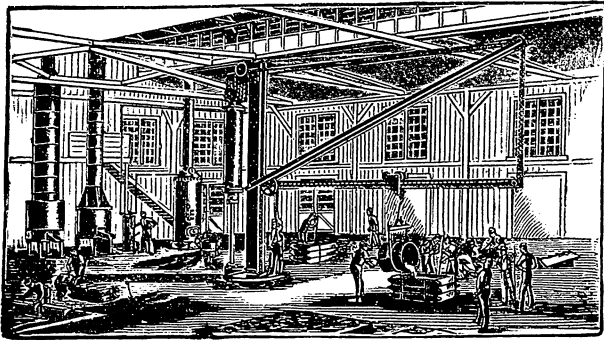
Embracing full explanations of Fundamental Principles; proper Disposition of Pulleys; Rules for determining widths of leather and vulcanized rubber belts, and belts running over covered pulleys; Strength and Proportions of Pulleys, Drums, &c. Together with the principles and necessary rules for Rope Gearing and transmission of power by means of Metallic Cables. By J. Howard Cromwell, Ph. B., author of a Treatise on Toother Gearing. 12mo, cloth. \$1.50.

Sent, post-paid, on receipt of price, by

David Williams, Publisher and Bookseller,

96-102 Reade Street, New York.

The Ridgway Steam-Hydraulic,



An Absolutely Perfect Crane!
STRONG CLAIM BUT TRUE.

The J. I. Case Threshing Machine Co. of Racine, Wis., have recently erected one of the largest and finest foundries in the world. They equipped it with Ridgway Cranes. We asked them the other day how they liked the Cranes. Behold the reply:

RACINE, WIS., April 23, 1894.

CRAIG RIDGWAY & SON, Coatesville Pa.

GENTLEMEN:—Answering yours of the 21st in regard to the Cranes purchased from you, will say I fully agree with you in saying they are the BEST FOUNDRY CRANES ON EARTH TO-DAY. THERE IS NOT ONE OBJECTIONABLE FEATURE IN THEM. We have them in constant use. Our moulder's helpers operate them with perfect satisfaction.

I am yours truly,

J. WALRATH, Supt. J. I. Case Co.

The Crane that is absolutely perfect for the exacting requirements of the foundry is the Crane for all places. We also make Steam-Hydraulic Elevators and Compressed Air Hoists.

SEND FOR CIRCULARS.

CRAIG RIDGWAY & SON, - Coatesville, Pa.

SELL THE BEST.

THE "SURE GRIP" Steel Tackle Block
is taking the place of all other hoisting blocks.

Send for catalogue and discount.

Fulton Iron & Engine Works,
28 Brush St., Detroit, Mich.
ESTABLISHED 1852.

—OR—
Rice Lewis & Son, Ltd.,
TORONTO, CAN.

Boring Tool.

The Armstrong Tool Holders
FOR TURNING, PLANING AND BORING METALS.

Practical all-around, every-day tools. Drop Forged of Steel and finished in a first-class manner. Nearly 15,000 already in use. 200 working in The J. A. Fay & Egan Co.'s shops. Manufactured only by Armstrong Bros. Tool Co., 78 Edgewood Ave., CHICAGO, ILL.

Pat. applied for.

Pat. Feb. 28, 1893.

SAFETY THRUST COLLARS.
—SOLID and SPLIT.—

Of character and at price to suit the most critical buyer. Dealers in shafting will consult their interests in writing for Price-List and Discounts.

THE GOUVERNEUR MACHINE CO.,
Gouverneur, N. Y.

Highest Efficiency.

WESTON'S NEW TRIPLEX Chain Block

far exceeds all predecessors. Send for Prof. Thurston's report of comparative tests of all chain pulley blocks.

The Yale & Towne Mfg. Co.
STAMFORD, CONN.
New York, 84-86 Chambers St.
Chicago, 152-154 Wabash Ave.
Philadelphia, 1120 Market St.
Boston, 224 Franklin St.

Foot & Hand Power Machinery.

Screw Cutting Lathes, Wood Turning Lathes, Scroll Saws, Circular Saws, Moulders, Mortisers, Etc.

Strictly High Grade. Catalogue Free.

SENECA FALLS MFG. CO.,
255 Water St., Seneca Falls, N. Y., U. S. A.

London Agency, MESSRS. CHAS. CHURCHILL & Co., 21 Cross St., Finsbury, London, E. C., England.

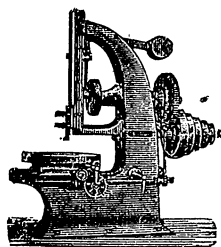
LATHES.

ISRAEL H. JOHNSON, JR., & CO., - PHILADELPHIA.

Engine Room Chat. By ROB. GRIMSHAW. This little book presents in colloquial style ideas which appeal to all interested in the generation of power, more particularly those charged with the care of engines and boilers and their appurtenances. 148 pages, cloth. \$1.00

For sale by DAVID WILLIAMS, 96-102 Rende st., N. Y.

LATHES PLANERS, SHAPERS, DRILLS, TOOLS.
Workmanship, Material, &c., Best. Prices Low.
MODERN DESIGNS. CAT. FREE. **SEBASTIAN LATHE CO.,** 113 & 115 Culvert St., CINCINNATI, O.

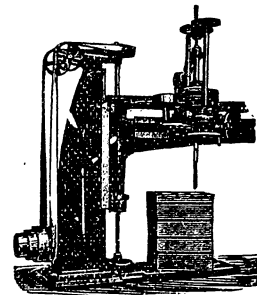


William Sellers & Co. Incorp.

PHILADELPHIA, PA.

—MANUFACTURERS OF—

Improved Machine Tools for Working Iron and Steel,
High Speed Power Traveling and Swing Cranes,
Injectors, Locomotive Turn Tables, Shafting, &c., &c.
Testing Machines, under patents of A. H. Emery.
Prices, Descriptive Matter, &c., Furnished on Application.



OPEN SIDE PLANERS.

READY FOR IMMEDIATE DELIVERY.

SPECIAL MACHINERY.

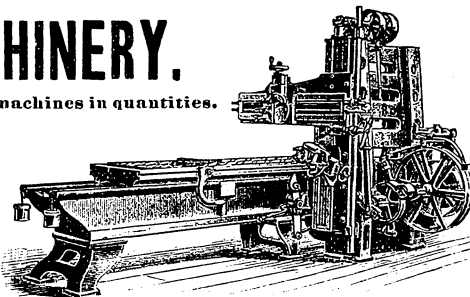
We will take pleasure in estimating on machines in quantities.

DETRICK & HARVEY

MACHINE CO.,

MANUFACTURERS,

BALTIMORE, - - MD.



**MORSE,
WILLIAMS
& CO.**

Morse Elevator Works.

ELEVATORS.

1105 Frankford Ave., Philadelphia. 108 Liberty St., New York.
1116 E. St., N. W., Washington, D.C. 33 Lincoln St., Boston.
425 Spruce St., Scranton, Pa. 82 Church St., New Haven.
Omaha Building, Chicago, Ill.

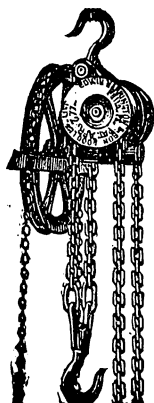
FAIRMOUNT MACHINE CO.,

(Successors to Thomas Wood & Co.)

Twenty-second and Wood Sts., Philadelphia, Pa.

Shafting, Gearing, Self-Oiling Bearings, Friction Pulleys, Elevators.

Rope Transmission; Sheave Wheels, any size required, for Hemp, Manila and Cotton Rope Driving. Looms, Cotton and Woolen Machinery for Winding, Spooling, Reeling, Beaming, Warping, Dyeing, Sizing, Scouring &c.



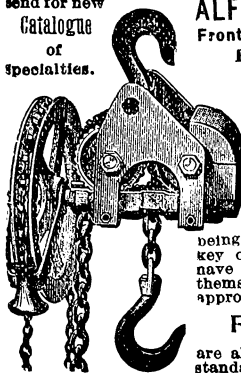
Machine Tools.

EDWIN HARRINGTON,
SON & CO., Inc.,
1508 Penna Ave., Phila., Pa.

LATHES.
★
PLANERS.
★
DRILLS.
★
HOISTS.

Traveling Cranes.

Send for new
Catalogue
of
specialties.



ALFRED BOX CO.,
Front, Poplar and Canal Sts
Philadelphia, Pa.

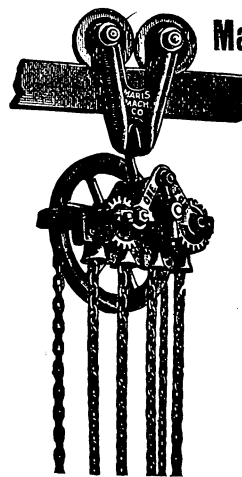
Manufacturers of
Box's Pat. Double

Screw Hoist
13,000 in use.

Many have done hard continuous duty 5 years without a single part being renewed. This is the key of our success. They have built up a reputation themselves that cannot be approached. Our improved

Radial Drills

are also assuming the same standard.



Maris & Beekley.
PHILA., PA.

MANUFACTURERS OF

CRANES,

Power Bridge
Cranes, Hand
Bridge Cranes,
Jib Cranes.

Portable Hoist.
Holds load at any
point.

Overhead Track,
Trolleys,
Switches.



SPEIDEL & ROEPER,
807 & 809 Cherry Street,
READING, PA.

Manufacturers of Spidel's Patent
Economic Safety Hoists,

500 to 30,000 lbs. capacity.
Have been awarded the "John Scott
Medal and Premium" by the Frank-
lin Institute of the City of Phila-
delphia, also Medal and Diploma by
the World's Columbian Exposition,
at Chicago, for Highest Effi-
ciency, Simplicity and Dur-
ability.

With our hoist one man can lift two
or three times as fast as with any other
hoist, it has two speeds, and is guar-
anteed to give satisfaction. Travel-
ing and Swing Cranes up to 30,000
lbs. capacity and 60 ft. span. Over-
head Tramway, Trolleys,
Switches and Special Hoisting
Machinery.

Self contained Elevators and Dumb-
waiters. Illustrated catalogue and
prices on application.



Moore Mfg. & Fdry. Co.,

Milwaukee, Wis., U. S. A.,
Manufacturers of

Moore's Anti-Friction

Differential

Chain

Pulley

Block.

A New Movement!
A Perpetual Com-
pound Lever!

Powerful, Simple and
Durable!

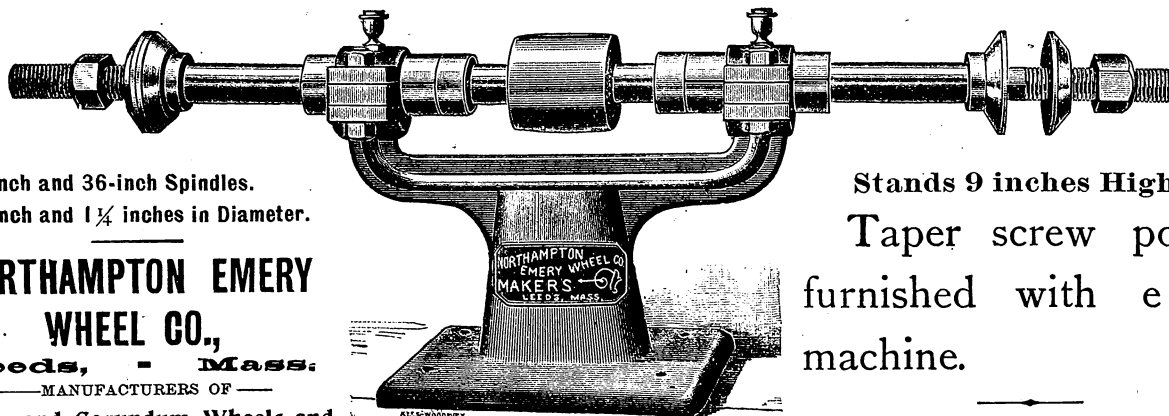
One Man Can Lift to
the Full Capacity of the
Block.

Self-Sustaining at Any
Point.

The Block Always
Hangs Plumb.

Send for descriptive price list
mentioning this paper.

BUFFING LATHE.



24-inch and 36-inch Spindles.
1 inch and 1 1/4 inches in Diameter.

**NORTHAMPTON EMERY
WHEEL CO.,**
Leeds, - Mass.
—MANUFACTURERS OF—

Emery and Corundum Wheels and
Emery Wheel Machinery.

Stands 9 inches High.
Taper screw points
furnished with each
machine.

Send for 1894 Catalogue.

Family Grindstones.

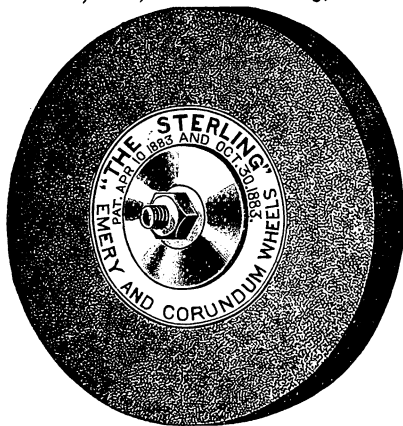
Great Reduction in Prices.

If you have not received our re-
vised price-list write for it.

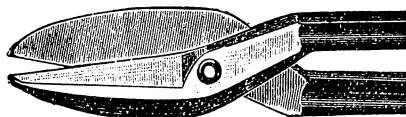
The Cleveland Stone Co.,
CLEVELAND, O.

Sterling Emery Wheel Company, 174 Fulton St., N. Y.
FACORIES:

Tiffin, Ohio, and West Sterling, Mass.



Cut in Two.



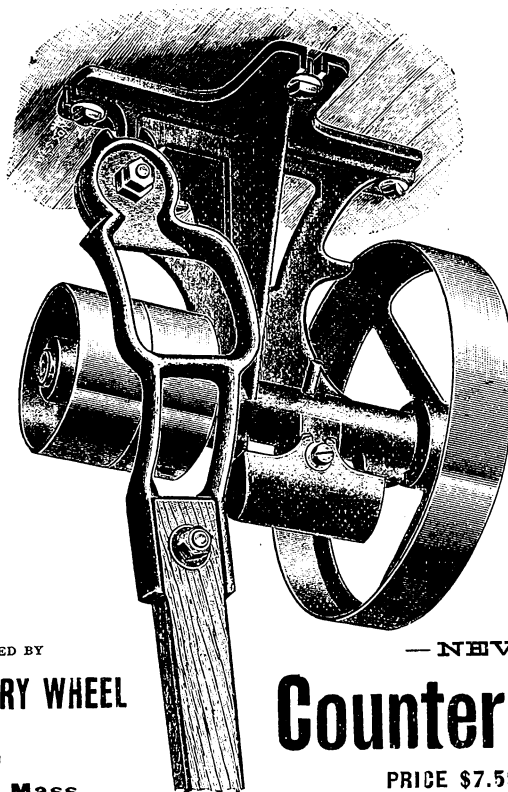
PART CASH AND PART SERVICE.
Send for Special Offer showing how.

Tinners' Tools AND MACHINES

May be obtained for a short time only
AT REDUCED PRICE.

By assisting us to introduce the
PEERLESS STEAM COOKER
In your locality.

Highest Award at the World's Fair.
Peerless Cooker Co., Buffalo, N. Y.



MANUFACTURED BY
**NORTON EMERY WHEEL
CO.,**
Worcester, Mass.

—NEW—
Countershaft:
PRICE \$7.50 NET.

Lathe Tool for Truing Emery Wheels of all Shapes.

The Bennett Tool, with conical cutter, has been in use for years. It is the only tool ever used successfully on any shape of wheels. No modern machinist should be without it. Manufactured by
BAY STATE STAMPING CO., Worcester, Mass.

YOU CAN TIN CAST IRON

By the Flanders process, now in use by some of the largest firms in the country. Correspondence solicited for the erection of galvanizing or tinning plants and **WELDED GALVANIZING KETTLES.**
THOS. SANDS, - - - Nashua, N. H.

The Encyclopedia of Founding and Diction- ary of Foundry Terms used in the Practice of Moulding.

Together with a description of the tools, mechanical appliances, materials and methods employed to produce castings in all the useful metals and their alloys, including brass, bronze, steel, bell, iron, and type-founding; with many original mixtures of recognized value in the mechanic arts. Also aluminum plating, gilding, silvering, dipping, lacquering, staining, bronzing, tinning, galvanizing, Britannia ware, German silver, nickel soldering, brazing, oros, smelting, refining, assaying, &c. By **SIMPSON BOLLAND**, Practical Molder and Manager of Foundries. Author of "The Iron Founder," "The Iron Founder Supplement," &c. 12mo, cloth, \$3.00.

FOR SALE BY

DAVID WILLIAMS, Publisher and Bookseller,
96 to 102 Reade Street, New York.

—THE—

E. J. MANVILLE MACHINE CO.,

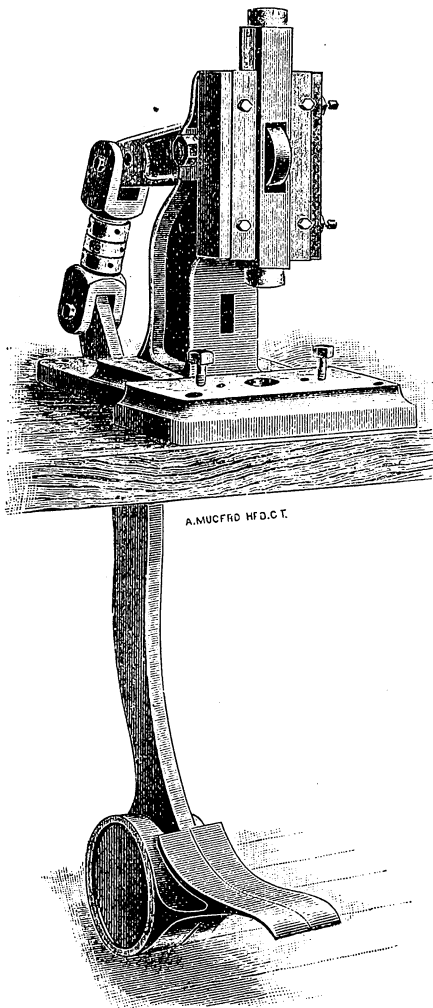
MANUFACTURERS,

WATERBURY, CONN.

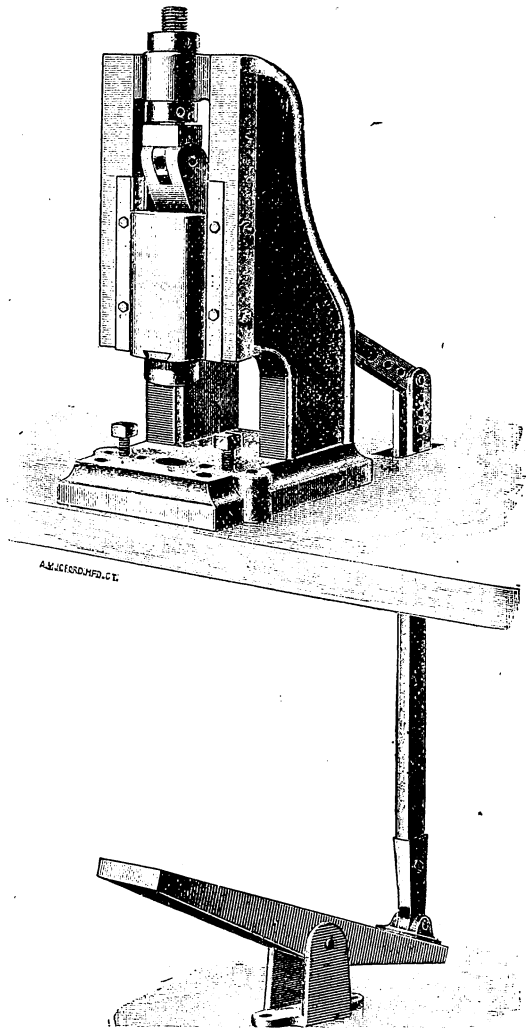
Large Line
of
Foot Presses
at
Popular Prices.

SPECIAL
AUTOMATIC
MACHINES.

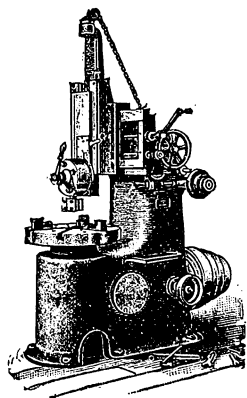
POWER PRESSES.

WIRE WORKING
MACHINES.

COMPOUND WEIGHT-LEVER FOOT PRESS.



KNUCKLE JOINT FOOT PRESS.



Lathes, Boring and Turning Mills, Turret Machines.

BRIDGEPORT MACHINE TOOL WORKS,
E. P. BULLARD, Prop., Bridgeport, Conn.

NEW YORK OFFICE, 86 LIBERTY ST. and 145 BROADWAY.

Get Your CRUCIBLE : STEEL : CASTINGS AND FINISHED IRON AND STEEL MOTOR GEARS

THE KING & ANDREWS CO.,
No. 218 N. Union Street, CHICAGO, ILLS.

We are especially equipped for heavy and light castings, prompt production and shipment, and have unsurpassed facilities for making the best quality of

SOLID STEEL CASTINGS.

Send Us Your Patterns and We Will Make the Castings While You Wait.

FOR NUMBERING AND LABELING
Boxes, Drawers and Shelves
In Hardware Stores and Factories.

Send for sample and description of our Handy
Box of small gummed Letters and Figures, intended
for labeling shelf boxes. Put up especially for the
Hardware trade.

THE TABLET AND TICKET CO., Mfrs.,
87-89 Franklin St. Chicago. 99 Franklin St.,
New York.

WILLSON'S PAPER LETTERS

What Congress Has Done—
000,000,000.

What We Are Doing—

Furnishing estimates on all classes of machine
work. Write us.

The L. E. Rhodes Co.,

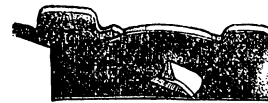
Hartford, Conn.

SPECIAL

And Automatic Machinery and Tools for
reducing cost of manufacturing machines, parts
of machines, articles of hardware, &c., de-
signed and built. Tools, models and experi-
mental work. Estimates given. Correspond-
ence solicited.

IDEAL MACHINE WORKS,

P. O. Box 655. Hartford, Conn.



J. Popping's
Patent Machine
and Tool Wks.

MANUFACTURERS OF

Solid Iron Shoulder Rabbet Planes, etc., etc., and
Hofstatter's Patent Hair Picking Machine.

N. E. Cor. 58th St. and 11th Ave., N. Y.



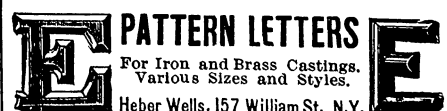
The Scattergood

Time Record and
Pay Roll Book.

(Pat. Oct. 13, 1891.)

Address for Circular to

HENRY W. SCATTERGOOD,
23 Richmond St., Phila., Pa.



For Iron and Brass Castings.
Various Sizes and Styles.

Heber Wells, 157 William St., N. Y.

SECOND-HAND MACHINERY, BOILER and BRIDGE TOOLS, STEAM HAMMERS, &c.

remaining unsold in the Engine and Tool Shop
we are closing out **WILL BE SOLD LOW.**

ENGINE LATHES.

11 in. x 5 ft. Phila.
12 in. x 6 ft. Reed.
13 in. x 6 ft. Blaisdell.
14 in. x 6 ft. Flatner.
16 in. x 6 ft. New Haven.
16 in. x 8 ft. Ames.
20 in. x 7 ft. N. V. S. Eng. Co.
20 in. x 8 ft. Putnam.
20 in. x 10 ft. Fitchburg.
24 in. x 12 ft. Putnam.
30 in. x 10 ft. Fitchburg.
32 in. x 15 ft. Gleason.
36 in. x 17 ft. Hewes & Phil.
40 in. x 24 ft. Ex. heavy.
84 in. x 20 ft. Lincoln.

PLANERS.

10 in. x 3 ft. Wheeler.
20 in. x 4 ft. Lathe & Morse.
24 in. x 4 ft. Blaisdell.
24 in. x 5 ft. New Haven.
26 in. x 7 ft. N. V. S. Eng. Co.
28 in. x 8 ft. Pease.
30 in. x 10 ft. Pease.
35 in. x 7 ft. Hewes & Phil.
36 in. x 10 ft. Gleason.
60 in. x 25 ft.

SHAPERS.

8 in. Stroke, Gould.
9 " " Hewes & Phil.
15 " " Hendey
16 " " Gould & Eber.
22 " " Geared.

MILLING MACHS.

Kemp Smith "Universal."
"New Improved Style."
Garvin No. 3 Bk. Geared.
Cincinnati No. 2 Bk. Gd.

J. J. McCabe,

14 Dey Street, - New York,

Successor to E. P. BULLARD'S N. Y. Machinery
Warehouses.

New and Second-Hand Machinery.

1 64 in. x 16 ft. Engine Lathe. Second-hand.
1 26 in. x 13 ft. Lowell Lathe.
1 20 in. x 12 ft. Hubbard Lathe. Compound
Rest, Power Feed. New.
1 20 in. x 8 ft. Gleason Lathe. Second-hand.
1 18 in. x 6 ft. Pond Lathe. Second-hand.
1 17 in. x 6 ft. Putnam Lathe. Second-hand.
2 16 in. x 6 ft. Davis Lathes. New.
2 16 in. x 8 ft.
1 13 in. French Turret Lathe. New.
1 30 in. x 30 in. x 8 ft. Davis Planer. New.
1 24 in. x 24 in. x 8 ft.
1 22 in. x 22 in. x 5 ft. Putnam Planer. Second-
hand.
1 20 in. x 20 in. x 5 ft. Putnam Planer. Second-
hand.
1 13 in. x 8 in. x 3 ft. Planer. Second-hand.
1 80 in. Radial Drill Press. New.
1 28 in. New Haven Drill Press, Power Feed.
Second-hand.
2 32 in. B. G. & P. F. Davis Drills. New.
2 25 in. B. G. & P. F.
6 20 in. Davis Standard Drills. New.
3 20 in. " B. G. Drills.
10 20 in. " Combined Wheel and Lever Drills.
New.
2 16 in. Sensitive Drills. New.
1 Brown & Sharpe Heavy Milling Machine.
Second-hand.
1 1 1/2 in. Bolt Cutter. Second-hand.
1 No. 1 Garvin Milling Machine. Second-hand.
83 in. Davis Cutting-Off Machine. New.
4 1/2 in. Davis Cutting-Off Machine. New.
This list will be changed each week.

W. P. DAVIS,

Rochester, N. Y.

PLANER, 24 in. x 24 in. x 8 ft., table. Good order \$185.00
No. 9 Sturtevant Exhaust Fan, weight 1500 lb. 90.00
No. 1 Dallett Portable Drill. Good as new. 90.00
88 in. Bk. Gd. Drill, heavy. Good as new. 275.00
Lathe 24 in. x 12 ft., Chuck, Tools, used 30 days. 350.00
Forging Drop, 100-lb. Hammer, New Design. 160.00
Wire Straightener and Cutter, Semi-Aut. 60.00
Bolt Cutter, Head and Dies, New, 3/4 to 1 1/2 in. 75.00
Power Punch Presses. \$75.00 and upward.

AMER. TOOL WORKS., Cleveland, O.

FOR SALE.

Wright Automatic Engine, 16 in. x 32 in.
Hall Electric Light Engine, 13 in. x 12 in., 100 H. P.
F. McSWEGAN & SONS,
Dover St. and Franklin Square N. Y.

B A R G A I N S In Second-hand Boilers.

Three 75 H. P. Vertical Tubular Boilers, 60 in. x 10 1/2
ft. Built of 1/2 in. steel. 162 2 in. Tubes 157 1/2 in.
long.
One 50 H. P. Vertical Tubular Boiler, 54 in. x 9 ft.
Built 5-16 in. steel. 200 2 in. Tubes.
Two 40 H. P. Vertical Tubular Boilers, 48 in. x 10 ft.
Built 5-16 in. steel. 120 2 in. Tubes.
Four 70 H. P. Locomotive Boilers, 178 in. over all. 54
in. waist. 123 2 1/2 in. Tubes. 119 1/2 in. long. Built
of 1/2 in. steel by Baldwin Locomotive Works.
One Horizontal R. T. Boiler, 58 in. x 15 ft. 38 4 in.
Tubes. Complete with full flush fronts and all
attachments.
One Horizontal R. T. Boiler, 48 in. x 16 ft. 22 4 1/2 in.
Tubes. Complete with full flush fronts and all
attachments.

These boilers are good for 100 lbs. pressure and up
wards and will be sold at the lowest prices. Apply
L. F. SEYFERT'S SONS,
437-441 N. 3d St., Philadelphia, Pa.

FOR SALE.

Planers, 48 in. x 16 ft., 42 in. x 18 ft., 32 in. x 9
ft. and 24 in. x 5 ft.
54 Stationary, Hoisting and Coupled Engines.
13 Steam Pumps.
22 Two Flued, Tubular, Fire Box and Vertical
Boilers.
8 Standard and Narrow Gauge Locomotives.
7 Sheet, Bar and Clipping Shears.
Grinding Pans, Crushers, Derricks, &c.

THOMAS CARLIN'S SONS,

Allegheny, Pa.

SECOND HAND MACHINERY.

ENGINE LATHES.

8 in. x 3 ft. Sebastian May.
Foot Power.
14 in. x 6 ft. Prentiss Bros.
Rise and Fall.
15 in. x 6 ft. Prentiss Bros.
Rise and Fall and Taper.
1 14 in. x 6 and 8 ft. Fitch-
burg. Rise and Fall.
17 in. x 6 ft. Ames. Rise
and Fall.
24 in. x 36 in. x 10 ft.
New Haven. Plain Gb.
24 in. x 36 in. x 13 ft.
Gould. Plain Gb.
20 in. x 12 ft. Ames. Com-
pound Rest.
37 in. x 10 ft. Fitchfield.
Compound Rest.
74 in. x 12 ft. Welsh.
Plain Gb.

PLANERS.

15 in. x 12 in. x 3 ft. New
Haven
16 in. x 16 in. x 12 in.
Belden. (Crank.)
16 in. x 16 in. x 3 ft. Pratt
& Whitney.
18 in. x 18 in. x 4 ft. Put-
nam Planer.
22 in. x 20 in. x 5 ft. Put-
nam Planer.
25 in. x 25 in. x 5 1/2 ft.
Huebner. (Screw.)
38 in. x 34 in. x 13 1/2 ft.
L. W. Pond.
51 in. x 45 in. x 15 1/2 ft.
New Haven.
61 in. x 54 in. x 9 ft. 10 in.
Betts.

SHAPERS.

6 in. Crank. Boynton &
Plummer
11 in. Crank. Bement.
12 in. Friction. Hendey.
13 1/2 in. Crank. Trav. Head.
Fitchburg.
15 in. Friction. Prentiss.

PRENTISS TOOL & SUPPLY CO.,
115 Liberty Street, New York. 59 South Canal Street,
Chicago, Ill.

LATHES.

1 28 x 8 New Haven.
1 each 22 x 8, 10 and 12.
3 24 in. x 12 ft. Lathes. Screw cutting without
changing gears.
1 21 x 8 Lodge & Davis Imperial.
1 each 21 x 8 Lodge & Davis Comp. and Plain.
1 21 x 11 Lodge & Davis Standard.
1 19 x 6 Pratt & Whitney.
1 16 x 6 Lodge & Davis "Tool Room."
1 19 x 6 Turret Lathe.
1 15 x 7 Turret Lathe.
3 each 12 in. and 15 in. Brass Finishing Turret
Lathes.
1 12 x 4 Hand Lathe.
1 30 in. Henley Pulley Lathe.
1 15 in. Shaper.
1 26 in. Triple Geared Shaper.
1 Gear Cutter, will cut up to 40 in.
1 each No. 2 and No. 4 Garvin Milling Machines.
1 Pratt & Whitney Lincoln Miller No. 3.
1 80 in. Die & Gang Radial.
1 26 in. Drill.
1 24 in. B. G. P. F. Drill.
1 20 in. W. & L. Drill.
1 each Norton & Jones Sensitive Drills, Nos. 1
and 3.
1 Grindstone and Frame.
1 Fox Trimmer No. 4 B.
1 Universal Saw Bench.
A full line of the most improved Engine
Lathes, Turret Lathes, Pulley Machinery, also
Motor Gear, Cylinder Boring and Triple Facing
Machines.
THE LODGE & SHIPLEY MACHINE TOOL CO.,
Cincinnati, Ohio.

FOR

MACHINERY

ADDRESS US.

Pennsylvania Mch. Co., Ltd.,
PHILADELPHIA, PA.

**WE HAVE REMOVED
OUR OFFICE**

- TO -

145 Broadway

AND

86 Liberty Street,

where we hope to have the
pleasure of a call from any
of our customers when in New
York.

Send for our latest list.

Geo. Place Machine Co.

32-INCH UPRIGHT DRILL PRESS.

TWO OF THEM; SECOND HAND.

Makers' Name, KERKHOFF & CO.
Height, 8 ft. 2 in.
Greatest Distance Spindle
to Base Plate, 52 in.
Greatest Distance Table
to Spindle, 38 in.
Weight complete, 2600 lbs.
Rack Geared and Power Feed, Quick Return,
Balanced Spindle; Shafts and Studs made of
Steel.

THE SCRANTON SUPPLY & MACHINERY CO.,
SCRANTON, PA.

FOR SALE.

2 Double Deck Boilers about 40 H.-P. each,
cheap. Hoisting Engine. Cylinder Boilers for
Stacks, 30, 36 and 42 in. diameter. Round and
Square Iron Tanks. Blow Offs. 5 Brass Can-
ons about 1400 or 1500 pounds each. Good
order. All kinds of Scrap Iron and Metals on
hand.

BUSSENTIUS & CUNLIFFE,
12th and Washington Ave., Philadelphia.

For Sale Cheap.

Special lot of NEW ENGINE LATHES

13 in. x 5 ft. 17 in. x any length bed.
15 in. x 6 ft. 27 in. x any length bed.
27 in. x 12 ft. 30 in. x any length bed.
32 in. x 12 ft. 32 in. x any length bed.

ADDRESS

Draper Machine Tool Co.,
Successors to
LATHE & MORSE TOOL CO.,
140 Gold Street WORCESTER, MASS.

FOR SALE.

The following second-hand tools in good order:
12 x 4 Lathe. P. & W.
34 x 8 1/2 Lathe. Putnam Machine Co.
50 in. double head Driving Wheel Lathe.
26 in. Chucking Machine. P. & W.
Milling Machine, double column, double head.
P. & W. Grant Pattern.
36 x 36 x 10 Sellers Planer.
Two 3-Spindle Drills, P. & W.
BRIDGEPORT MACHINE TOOL WORKS,
E. P. BULLARD, Prop., Bridgeport, Conn.
N. Y. Office, 145 Broadway and 86 Liberty St.

BARGAINS.

24 x 48 Miller & Allen Corliss Engine.
16 x 36 Slide Valve Engine.
16 x 24 " " " New.
15 x 30 " " " "
15 x 18 " " " "
14 x 30 " " " "
12 x 20 " " " New.
14 x 20 Vertical " "

A large number of new and second-hand Boilers, Engines, Lathes, Planers, Shapers, Millers, &c., in stock.

Write us for what you want and we will give you prices and full information.

LOVEGROVE & CO.,
Third and Quarry Sts., Phila., Pa.

We have just published a list of over

100 pieces of Machinery

OF DIFFERENT KINDS,
consisting of Lathes, Planers, etc. If you are in the market for any tools of this nature write us for circular.

HILL, CLARKE & CO.,

156 Oliver St., Boston, Mass.
12 and 14 South Canal St., Chicago, Ill.

SECOND-HAND MACHINERY.

1 Iron Planer 60 in. x 60 in. x 20 ft., 2 heads on Cross Rail.
1 Iron Planer 34 in. x 26 in. x 7 ft. 1 30 in. x 30 in. x 8 ft.
1 Iron Planer 24 in. x 24 in. x 4 ft. 1 32 in. x 25 in. x 6 ft. 6 in.
1 Iron Planer 16 in. x 12 in. x 3 ft. 1 20 in. x 20 in. x 5 ft.
1 Engine Lathe 24 ft. bed, 54 in. swing, D. W. Pond make, A1.
1 Engine Lathe 48 in. x 16 ft., raised to 60 in., Putnam make.
1 Engine Lathe 36 in. x 14 ft., Putnam make.
1 " " 26 in. x 10 ft., D. W. Pond make.
1 " " 21 in. x 25 ft. 6 in., A1. 1 24 in. x 14 in., New Haven.
1 Engine Lathe 20 in. x 12 ft., New Haven. 1 18 in. x 3 ft., New Haven.
1 Drilling Machine 40 in., B. G. S. F. 1 36 in., B. G. S. F., both New Haven.
1 Drilling Machine 30 in., R. G. Gould.
1 13 in. Shaping Machine, Gould.
1 5 in. x 10 in. Eureka Steam Hammer, A1.
1 425 in. Peck Lift Drop. Geared.
All kinds of Iron and Wood Working Machinery.
Lists sent. NEW YORK MACHINERY DEPOT,
Office 178 Broadway, N. Y.

Trustee's Sale of Machinery.

Lathe 52 in. swing, raised to 84 in., bed 40 ft. long. Cranes, 15 ton gib, 30 ft. high. Engines 16 x 24 in., 14 x 24 in., 12 x 24 in., 12 x 20 in., all new. Engines 14 x 30 in., 14 x 24 in., 4 x 8 in., refitted. Hundreds of Iron Pulleys and Flywheels. Four steel rim Cuyahoga Friction Pulleys 60 in. diameter, 15 in. face, with clutches. One ditto 72 in. diameter, 20 in. face.

WM. A. BOLE, Trustee,
Liberty Ave., cor. 25th St., Pittsburgh, Pa.

WANTED
Job Lots, Special Lots
HARDWARE,
MANUFACTURED GOODS, Etc.,
FOR CASH.
H. H. MANSFIELD, 126 Liberty St., N. Y.

WANTED.
To furnish reasonable estimates on specialties in light metal work.
CLARK & COWLES, Plainville, Conn.
Manufacturers of Clock Trimmings, Rivets, Springs &c.

SOME GOOD THINGS.

2 9 in. x 15 in. Blake Crushers.
1 8 in. x 20 in. Comly Crusher.
1 Hilles & Jones Angle Shear.
1 10 in. Heavy Alligator Shear.
1 Heavy Combined Punch and Shear.
1 Medium Combined Punch and Shear.
1 Ferris & Miles Steam Drop Hammer.
1 5 in. Hurlburt & Rogers Cut-off Machine.
4 No. 6 Cameron Steam Pumps.
1 8 in. x 5 in. x 10 in. Delamater Duplex pump.
1 10 in. x 5 in. x 12 in. Niagara Brass Pump.
1 10 in. x 6 in. x 12 in. Dean Pump.
1 14 in. x 12 in. x 18 in. Blake Pump.
Send for catalogue.

THOS. P. CONARD,
206 Walnut Place, Philadelphia.

FOR SALE.

Worthington Mine Pump

LEHIGH PATTERN.

20 in. High Pressure.
40 in. Low " "
9 1-2 in. Plungers.
36 in. Stroke.

IN FIRST CLASS ORDER and READY
for IMMEDIATE SHIPMENT. Address

"A," No. 621,

office of *The Iron Age*, 96-102 Reade St., N. Y.

Two 125 H.-P. Phoenix Automatic Compound Engines.
One 80 H.-P. Beck Automatic Engine.
One 60 and one 10 H. P. Westinghouse Automatic Engine.
10, 20, 30, 40 and 50 H.-P. Automatic Engines.
100, 200, 300 and 500 H.-P. Berryman Feed Water Heaters.
All the above in first-class condition and cheap.
FRANK TOOMEY,
131 N. Third St., Philadelphia, Pa.

SECOND-HAND RAILS FOR SALE.

In lots to suit and ready for shipment.

50 tons 20 lb. Iron T Rails.
150 tons 25 lb. Iron T Rails.
210 tons 30 lb. Steel T Rails.
120 tons 30 lb. Iron T Rails.
340 tons 35 lb. Iron T Rails.
250 tons 50 lb. Steel T Rails.
410 tons 54 lb Steel T Rails.
1700 tons 60 lb. Steel T Rails.
2200 tons 62 lb. Steel T Rails.
900 tons 70 lb. New Seconds Steel.
800 tons Johnson Girder Rails, 38, 47 and 52 lb.
All in excellent condition and selected. Sound
Rails of all sizes cut to specified lengths for
builders' use, foundations, vaults, kilns, &c.
Apply to

JOSEPH JEWKES, Steel Rails,
Pittsburgh, Pa.

AT ALL TIMES

we have on hand Steam Pumps, Second-hand and New. Every Second-hand pump is tested and guaranteed before leaving shop. Write us for information, also for catalogue, circulars, prices, etc., of the celebrated "Hooker Patent Steam Pump," which we manufacture.

HOOKE-COLVILLE STEAM PUMP CO.,
St. Louis, Mo.

SOME BARGAINS HERE.

1 Hendey Shaper, 15 in. stroke, imp. vise.
1 14 x 6 Screw Cutting Engine Lathe. New.
Pattern Makers' Speed Lathe. 7 ft. Bed, \$40. New.
2 1/2 Hendey Cutting-off Machine. New.
44 in. C. & D. Resaw. Fine condition.
Axle Cutting-off Machine, Double Head, cut 9 1/2 dia.
Quantity 2d hand Dodge Pulleys. Cheap.
Safety Construction Company's combined Trap and Pump.
And other machinery, new and second hand. Write for prices.
Machinery Supply Company,
89, 41 and 43 Central Ave., Rochester, N. Y.

A LARGE ADDITION TO OUR STOCK OF CORLISS ENGINES.

Also HIGH SPEED, Etc.

— SEND FOR CATALOGUE. —

Corliss—26 x 43, 23 x 36, 30 x 72, 10 x 20. Several large sizes guaranteed, viz: 18 x 43, 23 x 43, 28 x 43, 30 x 43, 26 x 60. Many other sizes on hand. Porter-Allen 11 x 16 and other High Speeds. An assortment of Horizontal Tubular Boilers, Large Duplex Fire Pump, Brennan Crusher, Platform Scales, Burr Mill, Bogardus Mill, etc., etc.
G. M. CLAPP, 74 Cortland St., N. Y.

SECOND-HAND MACHINE TOOLS.

ENGINE LATHES.	DRILL PRESSES.
1 12 in. x 5 ft. Geo. Gage.	2 10 in. Milliken Bench.
1 14 in. x 6 ft. Bogart.	1 0 in. Gardam Sensitive.
1 15 in. x 8 ft. Fitchburg.	1 10 in. 3 Spindle Lathe.
1 16 in. x 6 ft. Perkins.	1 No. 12 Spindle Garvin.
1 16 in. x 7 ft. Bement.	1 No. 23 Spindle Garvin.
1 16 in. x 6 ft. F. R. Reed.	2 No. 34 Spindle Garvin.
1 18 in. x 6 ft. New Haven.	1 No. 36 Spindle Garvin.
1 18 in. x 8 ft. Pease.	15 ft. Niles Radial.
1 20 in. x 6 ft. Bullard.	15 ft. McNeil Univ. Radial.
1 22 in. x 12 ft. Field.	1 7 ft. Aired Box Universal Radial.
1 37 in. x 14 ft. Old Style.	1 9 ft. Holly Mfg. Co. Radial.
PLANERS.	SCREW MACHS.
1 16 in. x 10 in. x 3 ft. Bel-den Machine Co.	1 No. 5 Brown & Sharpe.
1 22 in. x 22 in. x 4 ft. L. W. Pond.	1 No. 2 Brown & Sharpe.
1 24 in. x 24 in. x 6 ft. Novelty Iron Works.	1 No. 3 Windsor Mach. Co.
1 24 in. x 24 in. x 10 ft. Pease Planer Co.	1 No. 2 1/2 Pratt & Whitney.
1 28 in. x 28 in. x 7 ft. New Haven.	1 16 in. x 5 ft. Flather & Co.
	1 18 in. x 6 ft. Hendey Machine Co.
SHAPERS.	MILLING MACHS.
1 6 in. Boynton & Plummer.	1 No. 2 Garvin, Hand.
2 10 in. Juengst Crank.	1 No. 1 Garvin, power.
2 10 in. Wood & Light Traverse Head.	1 No. 5 Brainard, Standard.
1 15 in. Juengst Friction.	1 No. 2 Garvin Lincoln.
1 18 in. Putnam Traverse Head.	1 No. 4 Garvin Rail Feed.
	1 Garvin Heavy Slab Miller.

Also a large number of other machines. Write for complete list and detailed description.

THE GARVIN MACHINE CO.,
Laight and Canal Sts., New York
Also 51 North 7th St., Philadelphia, Pa.

!!! FOR SALE. !!!
RAKER BLOWERS, Nos. 3, 4, 5, 5 1/2, 7 and 7 1/2.
ROOT BLOWERS, Nos. 3, 4, 5, 6 and 7.
CAMERON VACUUM PUMP, 16 in. x 20 in. x 24 in.
KNOWLES PUMP, 14 in. x 10 in. x 12 in.
NIAGARA PUMP, 9 in. x 5 in. x 10 in.
1 No. 9 CLAYTON DUPLEX AIR COMPRESSOR, 22 in. x 24 in. x 30 in.
Horizontal Boilers, 18 ft. x 6 ft., 7 ft. x 3 ft. Fixtures.
Locomotive Boilers, 20, 60 and 100 H. P.
Machinery Buyers write to
C. R. BIGELOW, Machinery Expert,
45 Dey St., New York City.

FOR SALE. SECOND-HAND.

ENGINES, Horizontal and Vertical. All types and sizes up to 2000 H.-P.
BOILERS, Vertical and Horizontal, and 3 Batteries of "Heine" water tube.
MILLS, 3 high, 12 in., 20 in., 30 in. and 36 in.
1 Reversing 32 in. Blooming Mill complete.
STEAM HAMMERS. Various sizes up to 10 ton.
SHEARS for Bars, Rails, Blooms and Plates.
SQUEEZERS, ROLL LATHES, CRANES, GRINDING PANS, MACHINE SHOP TOOLS, &c.
LOCOMOTIVES. Fine condition, various sizes and gauges.

"If you don't see what you want, ask for it" of

B. M. EVERSON,
301 Smithfield St., Pittsburgh, Pa.

ALUMINUM GOODS

AND small CASTINGS in quantity to order. No goods for sale. All kinds of novelties made. If you are after information, enclose stamp. **THE H. H. FRANKLIN MFG. CO.,** Syracuse, N. Y.

FOR SALE.
The Star and Crescent Furnace, capacity 50 tons per day, with all the Buildings, Ore Lands, Tramways and Equipments. The whole of it new and in good running order. Plenty of ore, cheap charcoal, plenty of labor and plenty of water. Pig iron can be made cheaper than in any other part of the Union. This furnace is located on a railroad line and is situated in Cherokee County, Texas near New Birmingham. **LEON F. HAUBTMAN, Room 9, Godchaux Building, New Orleans, La.**

From the World's Fair Buildings.

SECOND-HAND
I Beams,
Channels,
Z Bars,
Angles
Trusses,
Girders,
Bolts, Nuts, Rivets, &c.,
Also about 275,000 ft. second-hand Lumber, Timber, Joist, Flooring, &c. For particulars, prices, &c., address

C. H. SIBELL & CO.,
218 La Salle St., Chicago.

SECOND-HAND MACHINERY.**ENGINE LATHES.**

- 2 11 in. x 5 ft. Raise and Fall Rest. R. & P. Prentice. A1 order.
- 1 15 in. x 6 ft. Plain Gib. Reed. A1 order.
- 5 16 in. x 6 ft. R. & F. and Plain Gib Carriage. Young, Blaisdell and Plather. A1 order.
- 1 17 in. x 8 ft. Comp. Rest. P. C. Feed. F. field. A1 order.
- 2 18 in. x 8 ft. Comp. Rest. P. C. Feed. F. field and Dustin. A1 order.
- 1 19 in. x 6 ft. Comp. Rest. P. C. Feed. F. field. A1 order.
- 3 20 in. x 6 ft. x 8 ft. Plain and Comp. Rest. Bulard. A1 order.
- 1 24 in. x 25 ft. Plain Rest. Lathe & Morse. A1 order.
- 1 38 in. x 18 ft. Comp. Rest. Bement, Colby & M. Fair order.
- 1 32 in. x 16 ft. Comp. Rest. Perkins. Practically new.

DRILLS. SINGLE SPINDLE.

- 2 20 in. Wheel and Lever Drill. Prentice & Davis. Good order.
- 20 in. Gear Drill. Very heavy. Good order.
- 1 20 in. x 38 in. Gap Wheel Feed Drill. Wood & Laight. Fair order.

GANG DRILLS.

- 8 Sensitive Drills. Slate, 1, 2 and 3 spindle. A1 order.

ALSO LARGE STOCK NEW TOOLS.

THE NILES TOOL WORKS CO.,
Eastern Branch, 136, 138 Liberty St., N. Y. City.

RAILS FOR SALE.**NEW AND SECOND-HAND**

Relaying rails of all sections. Second-hand Cut Rails for Rollers' Use. Also a small second-hand Engine and Boiler for sale.

J. H. RICHARDSON & CO.,
Pittsburgh, Pa.

SPECIAL.

We have several machines which we must sell immediately to turn into money at sacrifice prices.

- 1 "Peck" Drop Hammer and Lifter, 200 lb. drop.
- 1 Trip Hammer, 25 lb. blow.
- 1 Universal Milling Machine.
- 1 Polishing Tumbling Barrel.
- 2 Vertical Tubular 35 H. P. Boilers.

G. W. SCHULTZ & CO.,
308 Walnut St., PHILADELPHIA.

FOR SALE.**The Following Second-Hand. MACHINERY.**

- One Bickford Boring Mill.
- Four Craig Ridgway Steam-Hydraulic Cranes, good as new.
- One Iron Lattice Work Platform for Cupola.
- One 7 ton Cupola and Stack.
- One 3 ton Cupola and Stack.
- One Converter Stack.
- Three Converter Bottoms.
- Five 3 ton Ladles.
- Four Hand Boom Cranes.
- One Worthington Pump, 12 x 3½ x 10.
- One Sturtevant Blower No. 8, with Engine attached.
- One Sturtevant Blower No. 5.
- One Blake Air Compressor, 6 x 5 x 7.
- One Blowing Engine, steam Cylinder 28 in., Air 48 in.
- Two Wire Rope Transmission Wheels, 75 in. in diameter.
- One 30 H. P. Horizontal Engine.
- One No. 3 Springfield Gas Machine.
- Five Pneumatic Air Hoists, good as new.

For particulars apply to
MANNING, MAXWELL & MOORE,
111 & 113 Liberty St., New York.

FOR SALE.

Two patents with professional opinion on Sectional Steam Boilers, as well as patent on process and apparatus for shaping metals into shapes by electricity that heretofore could only be cast, thus enabling one to make the zigzag headers for sectional steam boilers of wrought iron or sheet steel in one piece and making the boilers adaptable for marine purposes. Address

G. ENGEL,
Hotel Washington, Jersey City, N. J.

- 2 Drills, P. & W. 1 and 2 spindle. A1 order.
- 6 Bench Drills. 5-16 in. capacity.

PLANERS.

- 1 24 in. x 24 in. x 6 ft. Planer.
- 1 27 in. x 27 in. x 8 ft. Planer.
- 1 60 in. x 60 in. x 22 ft. 4 Heads Planer.
- 1 60 in. x 60 in. x 22 ft. Hepworth Planer.

SHAPERS.

- 1 15 in. G. & E.
- 1 16 in. Smith.
- 1 24 in. Hendy.
- 1 17 in. Chase.

MISCELLANEOUS.

- 2 Punch Presses, Wilder & Stiles. In A1 order.
- 1 No. 3 Young Hand Shear. A1 order.
- 1 No. 2 Garvin Screw Machine, Wire Feed. A1 order.
- 1 Garvin Small Gear Cutter. A1 order.
- 6 Speed Lathes, Garvin & Young.
- 1 8 ft. Boring Mill, 2 Heads and Pulley At'cm't.
- 1 Bement Axle Lathe.

MILLING MACHINES.

- 4 No. 7 Brainard Millers, 2 with arms. A1 order.
- 3 Garvin Millers, Nos. 2, 3 and 4. A1 order.
- 1 No. 1 B & S. Universal Miller. Complete.
- 1 Garvin 1-Spindle Profiler.
- 1 P. & W. 2-Spindle Profiler.

BIG BARGAINS.**Second-hand Machinery For Car Shops.**

- 1 38 in. 150 ton Hydraulic Wheel Press.
- 1 Bement, Miles & Co. Single Axle Lathe.
- 1 36 in. Bement, Miles & Co. Car Wheel Borer with Hand Crane.
- 1 No. 6 J. A. Fay & Co. Car Mortiser and Borer.
- 1 J. A. Fay & Co. Car Tenoning Machine.
- 1 J. A. Fay & Co. No. 2½ Pacific Planer and Matcher.
- 1 J. A. Fay & Co. Universal Horizontal Car Borer.
- 1 J. A. Fay & Co. No. 4 Tenoning Machine.
- 1 Lane & Bodley Large Car Mortiser and Borer.
- 1 1 inch Double National Bolt Cutter.
- 1 J. A. Fay & Co. Vertical 3-Spindle Car Borer.

Write for full list of new and second-hand Wood and Iron Working Machinery.

U. Baird Machinery Co.,
Pittsburgh, Pa.

FOR SALE.**CRANK and GEARED SHAPERS.**

Write us for Bargains.

J. STEPTOE & CO., Cincinnati, O.

Second-hand Machinery For Sale.

- 2 36 in. x 11 ft. Horizontal Stationary Boilers.
- 1 12 H.-P. Upright Engine (Greenfield).
- 1 18 H.-P. Upright Boiler.
- 1 15 H.-P. Horizontal Engine.
- 1 14 to 1½ in. Open Die Bolt Cutter.
- 1 24 in. x 25 ft. Engine Lathe.
- 2 No. 2 Roots' Blowers.
- 2 No. 6 Roots' Blowers.

Also other machinery at low prices.

COOKE & CO.,
163 and 165 Washington St., New York.

For Sale, Very Low for Cash.

1000 tons relaying 60-lb. Steel T Rails, 500 tons relaying Steel. Street Rails, side bearing, 35 to 47 lbs. sections. Also 3 tanks 7½ ft. diameter, 10 ft. high.

WM. H. PERRY & CO., Providence, R. I.

FOR SALE CHEAP.

A lot of Rolling Mill Machinery, Engines, 30-inch Plate Trains, Shears, Testing Machines, Cranes, Pumps, Electric Light Machines, turtenant Blower, etc., etc. Full particulars by applying to

MATTHEW GILL, Jr.,
308 Walnut St., Phila., Pa.

FOR SALE.

Following machinery guaranteed first-class condition, some of these tools practically new. Prices on application.

- 1 No. 2½ and 4 No. 2 Pratt & Whitney Revolving Head Screw Machines with wire feed.
- 1 Brown & Sharpe No. 3 Universal Cutter and Reamer Grinder.
- 1 Beaman & Smith Horizontal Boring Mill, table 6 ft. x 10 ft. with 6 in. bar.
- 2 50 in. Gould & Eberhardt entirely automatic Gear Cutters, will cut worm, spur and bevel gears.
- 1 in. Hurlburt & Rogers Cutting-off Machine.
- 1 No. 2 Garvin Spring Collet, with die for cutting springs and die for looping them.
- 1 Adt Wire Straightening Machine.
- 2 15 in. Bardons & Oliver Monitor Lathes with draw back collet.
- 1 Garvin Screw Slotting Machine.
- 1 Pedrick & Ayer 8 in. Wing patent wet Grinder.
- 3 American Tool & Machine Co.'s speed Lathes, 14 in. swing with dove tail set over and 2 motions to spindle.
- 6 10 in. speed Lathes with quick return to spindle for drilling.
- 1 No. 2 American Tool & Machine Co. Cabinet Turret Lathe 6 ft. bed 18 in. swing with back gears, screw apparatus, slide rest and box body chucks.
- 1 Iron Planer 28 x 28 x 7 ft., J. S. Wheeler & Co. make.
- 1 Engine Lathe 24 in. swing, 14 ft. 6 in. bed, latest pattern, New Haven Mfg. Co. make.
- 1 Engine Lathe 16 in. swing, 6 ft. bed hollow spindle, Sebastian Lathe Co. make.
- 1 14 in. Engine Lathe, 6 ft. bed hollow spindle, complete, Blaisdell Tool Co. make.
- 1 No. 9 Buffalo Forge Co. Shear, hand power.
- 2 Diamond Machine Co.'s Emery Stands with belt polishing attachment.
- 6 Polishing Lathes.

C. C. WORMER MACHINERY CO.,
55, 57 and 59 Woodbridge St. W., Detroit, Mich.

LODGE AND DAVIS

Machine Tool Co., Cincinnati, O., U. S. A.,

Have for sale a large line of first-class second hand Engine Lathes, Planers, Shapers, Drill Presses, Milling Machines, &c.

WRITE FOR LIST AND PRICES.

PITTSBURGH SALES AGENCY,

J. H. HILLMAN, Manager,

No. 8 Wood St.,
Pittsburgh, Pa.,

Offers for sale at very low prices BESSEMER STEEL WORKS and STRUCTURAL STEEL MILLS, also STEEL MILL for Rolling Bars and cold rolling, two BLAST FURNACES, a RUSTLESS IRON WORKS, interest in TIN MILL in INDIANA, TUBE WORKS and numerous other manufacturing interests and large quantity of very desirable COAL PROPERTIES, improved and unimproved.

Dealers in Coal and Iron Lands.

Examinations and Reports

on Properties.

References on Application.

Mill and Factory Property at Auction.

It is often advisable or necessary to sell Mill and Factory Property at Public Auction. We take entire charge of Auction Sales of Manufacturing Property, both Real Estate and plant, in all parts of the country. For OWNERS, RECEIVERS, ASSIGNEES and ADMINISTRATORS. Particulars on application.

E. DE FOREST SHELTON & CO.,
SPECIALISTS MANUFACTURING PROPERTY,
Stewart Building, 280 Broadway, New York City.
Mill and Factory Property Negotiated.

For Sale or Lease.

TO CLOSE AN ESTATE.

Bloomfield, NEW JERSEY.

Brass Rolling Mill and Factory Buildings. Fully equipped and in good condition. Price low. Payments easy. Apply on the premises or to

JOHN M. GWINNELL,

Newark, N. J.

Care of Estate of P. Hayden.

FOR SALE.

A new iron building for immediate shipment, 81 ft. wide, 200 ft. long, consisting of a main span 61 ft. wide, with lean-to on one side 20 ft. wide. The trusses are sufficiently strong to carry a line of shafting and light jib crane. This building is suitable for a Machine Shop, Tin Plate Mill, Rolling Mill, etc. For further information address

SHIFFLER BRIDGE CO.,
Pittsburg, Pa.

J. A. COLEMAN.

Author Coleman's Mechanic's Liens in Illinois.
Attorney at Law,

82 Hartford Building, Chicago.
MECHANIC'S LIENS EXCLUSIVELY.

FOR SALE. COMPLETE WIRE NAIL MILL

75 Machines, Buildings And
10 Acres of Ground,
Including two Gas
Wells.

LOCATED AT ANDERSON, IND.

ADDRESS
"FIELD," Box 747, Cincinnati, O.

Specialties Wanted.

A manufacturer, whose line of tools is not equal to the capacity of his works, would like to add some new specialty tools to his present line. For further information address

"TOOL SPECIALTIES,"

Office of *The Iron Age*, 96-102 Reade Street, New York.

Wanted to Exchange.

A paper mill now running on orders for its entire product, to exchange for a desirable stock of hardware in a good location.

BOX 152,

Seneca Falls, N. Y.

FREE GROUND FOR MANUFACTURERS.

Ground will be given free of all cost to any good reliable party who will erect and operate a manufacturing plant at Mill Hall, Pa. An elegant location for the rolling of Tin Plate. Three railroads, an abundance of good water, bituminous coal at the door, mountains of limestone and fire clay in abundance. The place surrounded by good farming country. The town already has three large Axe works, one large Street and Press Brick works, Wagon works, Patent Lime Kilns, Grist Mill, &c. An Electric Railway now in course of construction which will connect Mill Hall with Lock Haven, the county seat. For further information address or call on T. H. HARMON, Lock Haven, Pa.

Important Notice to Investors.

FOR SALE

A valuable patent. A combination kitchen tool. Granted January 2d, 1891. Will sell entire patent or State rights at a bargain. For full particulars address the patentee,
A. A. CUDDY,
Carlisle, Pa.

FOR SALE.

Steam Pump, Worthington, size 12 in. x 6 in. x 10 in., in good order. Capacity 400,000 gal. per day. Address AMOS. ANDREWS, Superintendent Plainfield Water Supply Co., Plainfield, N. J.

A QUICK SELLING SIDE LINE

for Hardware and Stove traveling salesmen, in many cases making you \$60 per month in commissions. Cole's Airtight Heater holds fire 20 hours with coals and 48 hours with wood and sells at sight to every enterprising stove man. Address

COLE & COLE,

Council Bluffs, Iowa.

FOR SALE.

A second-hand Rotary Squeezer and train of Rolls as good as new. Price ¼ cent per pound. Address

"ROLLS,"

Office of *The Iron Age*, 220 So. 4th. St., Philadelphia, Pa.

EXECUTOR'S SALE

of Hardware, Plumbing and Metal Working business to close estate of late James G. Burt. Business established twenty years. Stock and fixtures \$20,000 to \$25,000. A rare opportunity for investment in paying business in "Sunny California." Address

D. A. MOULTON, Executor,

San Bernardino, Cal.

FOR SALE.

One 15 x 24 Trenton Automatic Engine used but a short time. Good as new. Fly-wheel and Pulley 3 ft. 6 in. diameter, 18 in. face. One extra Pulley the same size. Will be sold at a bargain. Address WILSON BROS., Easton, Pa.

MAP OF THE UNITED STATES.

A large handsome map of the United States mounted and suitable for office or home use, is issued by the Burlington Route. Copies will be mailed to any address (mentioning *The Iron Age*) on receipt of fifteen cents in postage by P. S. EUSTIS, Gen'l Pass. Agent, C., B. & Q. R. R., Chicago, Ill.

Collections?

ATTENTION! Merchants and Manufacturers.—We collect your past due accounts. Do not let them remain too long upon your books. Send for our draft book.

THE HARDWARE BOARD OF TRADE, Ltd.
4 and 6 Warren street, New York.
JAS. H. GOLDEY, Treas.

EUGENE V. N. BISSELL, Auctioneer.
E. BISSELL, SON & CO.,
Successors to
HAYDOCK & BISSELL,
WHOLESALE

HARDWARE AUCTIONEERS,
19 Murray St. and 15 Park Place, N. Y.
Sales held weekly for the trade. Consignments solicited. We refer to the leading manufacturers and importers.

FOR SALE. HARDWARE STOCK.

A nice clean stock that will invoice about \$4000. Located in a county seat town in Central Iowa of 2500 inhabitants. Good schools and churches, fine farm land, well established trade. Good reasons for selling, which will be explained on application. Will sell cheap for cash only. Address "CENTRAL IOWA," office of *The Iron Age*, 96-102 Reade St., New York.

AN OLD ESTABLISHED hardware house in New York, whose salesmen cover the entire United States, wants the sole agency of American manufacturers of Chains, Toilet Clippers, Locks, Files, Carpenters' Tools and similar articles. Address

"W. B. G.," No. 105,

Office of *The Iron Age*, 96-102 Reade St., New York.

ADOLPH BUTZE,
Manufacturers' Agent.
Railroad, Packing House and Contractors' Supplies.

—AGENT FOR—

LATROBE STEEL WORKS, Locomotive and Car Wheel Tires. UNITED RUBBER CO., Hose, Packing, &c. GEO. GRIFFITHS CO., Shovels, Scoops, &c.
Corrugated Galvanized and Sheet Iron, Plate, Tank and Bar Iron, Waste—White, Colored and Wool.

Bank of Commerce Bldg. St. Louis, Mo.

NOW is the time to INVEST in
**SOUTHERN TIMBER-
MINERAL LANDS,**

Before prices advance. All kinds of mines for sale.

E. C. ROBERTSON,

Terms Easy. CINCINNATI, O. Titles Perfect.

LUXURY ON WHEELS.

Solid through trains between Cincinnati, Toledo and Detroit. Pullman Vestibuled Trains between Cincinnati, Indianapolis and Chicago. Through car lines from Cincinnati via Indianapolis to St. Louis; also Cincinnati via Indianapolis to Decatur, Springfield, Ills., and Keokuk. These are the only lines running Pullman Vestibule and Dining Cars between the cities named. See that your ticket reads via Cincinnati, Hamilton and Dayton.

WM. M. GREENE, Gen'l Manager,
D. G. EDWARDS, Gen'l Passenger Agent
Cincinnati, O.

FOR SALE OR TO LEASE on good terms, a manufacturing water power plant. Stone buildings, 1300 horse power, fully equipped with turbines, suitable for a wood pulp mill, electrolytic refining works or metal rolling mill. Advantageously situated. Address "WATER POWER," office of *The Iron Age*, 96-102 Reade St., New York.

A CHANCE.

Our goods are well known and we have a strong hold in the hardware and carriage hardware trade. Our representative is thoroughly acquainted and wants an additional line to handle. Address

"STRONG HOLD,"

Office of *The Iron Age*, 96 102 Reade St., N. Y.

Pat. Aug. 7, 1883.
" Aug. 25, 1885.
" Jan. 26, 1886.



**The Champion
SIDE
SASH LOCK**

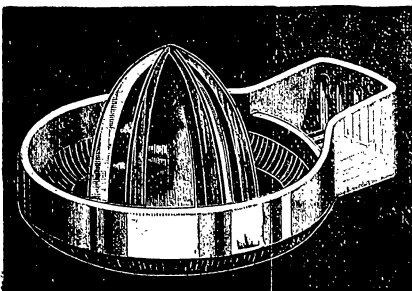
Has by its unequalled merits gained the public favor. It is a safe ventilator and prevents rattling. Is neat, cheap, simple and durable. It has been in extensive use for over eight years, and has become a staple article with the Hardware trade.

Beware of Worthless Imitations.

THE
Champion Safety Lock Co., Cleveland, O.

If advertising absorbs any of your "principal," it presumably entitles to some extent your "interest" also. Do you feel quite certain that the betterment of your various advertising ventures in their matter, manner (or per- adventure in both, might not be possible? Striking effects do not neces- sitate extended space—(witness this adver- tisement, which your eye doubtless detected without a prolonged search). If you DO take an interest in adver- tising matters, I will pay you to address Box 287, for "Circular No. 9." You need not be remind- ed that 'tis "bad form" to open any corres- pondence with a Postal Card, there- fore, should you write, please enclose two cents in place of one. This "Circular," No. 9, costing you nothing, is at least worth so much.

You Don't Need a Cup TO USE WITH THE MONITOR,



As it is a complete Lemon Juice Extractor, Cup and Strainer all in one. Every one says they are nice and work so easy, and cheap enough for any one in glass, but perfection itself when made in pure cast aluminum.

MADE ONLY BY

Patented December 15, 1891.

STERLING ALUMINUM CO.,

1195 FULTON STREET,

BROOKLYN, N. Y.

D

HELP WANTED.

Undisplayed Advertisements for Help Wanted not exceeding fifty words One Dollar each insertion. Additional words two cents each.

TRAVELING SALESMAN to handle as a side line, on commission, hardware specialties thoroughly introduced all over the country and requiring little effort to make sales; no one without experience in the trade and good references need apply. Address "TRAVELERS," office of *The Iron Age*, 220 So. 4th St., Phila., Pa.

SALESMAN WANTED to sell German pocket knives, scissors and razors on the road; only competent men need apply; state experience and salary expected. Address "CUTLERY IMPORTER," office of *The Iron Age*, 96-102 Reade St., New York.

AN EXPERIENCED practical metallurgist and chemist, competent to take entire charge of a steel works melting and casting department. Address "CRUCIBLE," office of *The Iron Age*, 96-102 Reade St., New York.

A FIRST-CLASS SALESMAN to carry our goods as a side line in South and West. **KEYSTONE DOG COLLAR MANUFACTURING COMPANY**, 505 Commerce St., Philadelphia, Pa.

FOREMAN for Special Foundry; one familiar with water works specials, including loam castings, and competent to handle a force of men and manage a shop economically. Address "CASTINGS," No. 75, office of *The Iron Age*, 96-102 Reade St., New York.

TWO EXPERIENCED Hardware Clerks, fully competent to sell goods and take charge of stock; only first-class help need apply. Address "ERIE," No. 95, office of *The Iron Age*, 96-102 Reade St., New York, giving reference, experience and salary expected.

A PATTERN MAKER, familiar with water works specials and competent to do the necessary drafting; answer, giving age, wages expected, experience, &c. Address "PATTERNS," No. 75, office of *The Iron Age*, 96-102 Reade St., New York.

GENERAL AND BUSINESS MANAGER wanted for large steel casting concern, with large important specialties; only those familiar with the manufacture of steel and of proved high executive and business ability need apply. Address **WILSON**, 51 Tribune Building, New York.

A MAN who thoroughly understands the making of sheet iron; must be capable and competent to erect and take charge of a mill; no man but one who is thoroughly familiar with the business in all its details need apply. Address "SHEET IRON," No. 614, office of *The Iron Age*, 96-102 Reade St., New York.

SITUATIONS WANTED.

Undisplayed Advertisements for Situations Wanted not exceeding fifty words Fifty Cents each insertion. Additional words one cent each.

A THOROUGHLY competent mechanical engineer is at liberty for engagement; the advertiser has had a wide practical experience and is well qualified by education, knowledge and ability to fill a responsible position; location immaterial. Address "SPARTAN," office of *The Iron Age*, 96-102 Reade St., New York.

CHEMIST with thorough metallurgical education and wide experience in blast furnace work, the manufacture of Bessemer, open hearth and crucible steels castings, etc., desires charge of laboratory or position as inspector, superintendent or assistant in metallurgical department. Address "STEEL EXPERT," office of *The Iron Age*, 96-102 Reade St., New York.

BY A MIDDLE AGED married man; has had extensive experience as bookkeeper, special accountant, keeping cost sheets, etc., of the various articles manufactured in machine shop, boiler shop, foundry and wire mill work. Address "CLERICAL," office of *The Iron Age*, 96-102 Reade St., New York.

IN THE HARDWARE BUSINESS, by a man who has had sole charge of a large hardware store in Central Pennsylvania for the last five years; manager of some department preferred, with the idea of taking an interest; satisfactory reasons given for making a change; best of references given. Address Box No. 21, Philipsburg, Centre Co., Pa.

BY A FIRST-CLASS TOOL AND DIE maker; long experience in one of the largest electric factories in the old country. Understands construction and mechanical work. Steady position desired. **EMIL GEBAUER**, 515 E. 151st Street, New York.

A PUSHING, practical foundry foreman with a good executive ability in handling work and men, well up in mixing and melting metals, core making and general foundry knowledge, wants position; loam, green or dry sand, engine work or heavy machinery preferred; American, temperate, age 38, references A1. Address "EXECUTIVE ABILITY," office of *The Iron Age*, 96-102 Reade St., New York.

BY AN EXPERIENCED ENGINEER familiar with the design and construction of basic and acid open hearth steel melting furnace, blooming mill and rolling mill plants. Address "S. C. H.," No. 712, office of *The Iron Age*, 96-102 Reade St., New York.

BY A PRACTICAL MAN, as foreman of iron foundry; has had large experience as such in making all kinds of light and heavy work in green or dry sand; best of references from last employer. Address "A. P. S.," No. 75, office of *The Iron Age*, 96-102 Reade St., N. Y.

A WIDE AWAKE educated young man wants general agency for a few good specialties, or would take agency for several counties, including Philadelphia; will take office in central location and push a good thing for all it is worth. Address "HUSTLER," office of *The Iron Age*, 220 So. 4th St., Phila., Pa.

THE UNDERSIGNED takes this method of making known his wish to enter into correspondence with manufacturers who might be in need of such services as he is able to render; he has had experience in various departments of shop and office work, having occupied the stations of assistant manager and manager of extensive works; manufacturers desiring assistance in any department in which his training and experience can be utilized to mutual advantage are requested to address **ROBERT A. MILLER**, Canton, Ohio.

THE LATEST BOOKS.

Manual of Practical Pattern Making and Molding. By W. H. WILSON. Specially arranged, with numerous illustrations, for the use of technical students, artisans and engineers. 8vo, cloth, \$3.40

Workshop Appliances. Including descriptions of some of the Gauging and Measuring Instruments, Hand Cutting Tools, Lathes, Drilling, Planing and other Machine Tools used by Engineers. By C. P. B. SHELLEY. Revised and enlarged. Tenth edition, with an additional chapter on milling, by R. R. LISTER. 12mo, cloth, illustrated. (Text-Books of Science.) \$1.50

Electrician at Home. In Two Parts. Part I. Electro-Plating at Home, by GEORGE EDWINSON. Part II. Electric Bells, by GEORGE EDWINSON. Illustrated with numerous diagrams and explanatory sketches. Edited by F. CHILTON YOUNG. 12mo, cloth. (Amateur's Practical Aid Series.) \$0.40

The Practical Electroplater. A Comprehensive Treatise on Electroplating, with notes on ancient and modern gilding, and formulas for new solutions. By MARTIN BRUNOR. 8vo, half leather, illustrated. \$10.00

Practical Paper Making. A Manual for Paper Makers and Owners and Managers of Paper Mills, to which are appended useful tables, calculations, data, &c. By GEORGE CLAPPERTON. With illustrations reproduced from micro-photographs. 8vo, cloth. \$2.50

How to Make and Use the Telephone. A practical treatise for amateurs, with working drawings. By G. H. CARY. 117 pages, illustrated, cloth. \$1.00

Electrical Measurements for Amateurs. By E. TREVERT. 117 pages, illustrated, cloth. \$1.00

How to Run Engines and Boilers. By E. P. WATSON. Second edition, illustrated, 116 pages, cloth. \$1.00

The Practical Management of Dynamos and Motors. By F. B. CROCKER and S. S. WHEELER. Second edition. Illustrated, cloth. \$1.00

A Handbook of Gold Milling. By H. LOUIS. 504 pages, buckram. \$1.00

The Uses of Compressed Air. By A. C. RAND. With illustrations. Oblong, cloth. \$1.00

Electric Light Installations. Vol. II. apparatus. A practical handbook. By S. DAVID SALOMONS. Seventeenth edition, revised and enlarged, with 296 illustrations. 12mo, cloth. \$2.50

The Gas Engineer's Laboratory Handbook. By J. HORNBY. 12mo, cloth. \$2.50

AN ACTIVE, ENERGETIC young man, excellent penman, desires position; well acquainted with bolt and rivet manufacture, bolt threading, forging and tapping, sleeve nuts, upset rods and eye bars, piece work prices and estimates, smith work and hydraulic forgings; can handle men and conversant with all details of shop work. Address "THOROUGH," Box 712, office of *The Iron Age*, 96-102 Reade St., N. Y.

AS ROLLING MILL SUPERINTENDENT or Mill Manager, by a practical man who has been managing mills the past 25 years; has had a long experience in working scrap, old iron and steel rails; can furnish good testimonials and references. Address "S. H.," Box 98, Lebanon, Pa.

AN EXPERIENCED TRAVELER well acquainted with the hardware trade in Michigan, Northern Indiana and Ohio, now representing a factory in Connecticut, would like to add a small sample or good catalogue line for this territory to share expenses. Address **AMES**, 411 4th Ave., Detroit, Mich.

A MEMBER OF AMERICAN SOCIETY of Mechanical Engineers, who has had 20 years' practical experience as follows: machinist, head draughtsman, erecter of steam plants, engineering, estimating, contracting and office work and superintendent of large engine works, is available for responsible position. Address "ENGINE WORKS," No. 18, office of *The Iron Age*, 96-102 Reade St., New York.

AS SUPERINTENDENT of stamping works or foreman, die or tool maker; 35 years of age; last six years in similar position with leading firm; thoroughly posted in sheet metal of all kinds; highest references. "TOOLS," care Rudolph & Krummel, 98 North Clinton Street, Chicago.

EXPERIENCED hardwareman and traveler wishes to represent on the road manufacturer of hardware or cutlery or hardware commission house in territory west of Pittsburgh or south of Cincinnati; can furnish first-class references. Address "F. F. S.," No. 621, office of *The Iron Age*, 96-102 Reade St., N. Y.

A Brief Introduction to Qualitative Analysis for Use in Instruction in Chemical Laboratories. By LUDWIG MEDICUS. Translated from the fourth and fifth German editions with additions by JOHN MARSHALL. 113rd edition. 8vo, cloth. \$1.60

Directory of the Iron and Steel Works of the United States for 1894. Embracing full list of blast furnaces, rolling mills, steel works, tin plate works and forges and bloomeries in the United States; also of all the rod mills, wire mills, cut nail works, wire nail works, and horse nail works, car axle works, car wheel works, car builders, locomotive works, cast and wrought iron pipe works, shipbuilding and bridge building works. 292 pages, cloth. \$5.00

The Encyclopedia of Founding and Dictionary of Foundry Terms used in the Practice of Moulding. Together with a description of the tools, mechanical appliances, materials and methods employed to produce castings in all the useful metals and their alloys, including brass, bronze, steel, bell, iron, and type founding; with many original mixtures of recognized value in the mechanic arts. Also aluminum plating, gilding, silvering, dipping, lacquering, staining, bronzing, tinning, galvanizing, Britannia ware, German silver, nickel soldering, brazing, ores, smelting, refining, assaying, &c. By SIMPSON BOLLAND, Practical Molder and Manager of Foundries. Author of "The Iron Founder," "The Iron Founder Supplement," &c. 12mo, cloth. \$3.00

Sewage Disposal in the United States. By GEO. W. RAFTER, M. Am. Soc. C. E., and M. N. BAKER, Ph. B. 8vo, cloth, illustrated, 600 pages. \$6.00

Water or Hydraulic Motors. By P. J. BJORLING. 287 pages, 206 illustrations, 12mo, cloth. \$3.50

Induction Coils and Coil Making: a treatise on the construction and working of shock, medical and spark coils. By F. C. ALLSOP. 118 illustrations, 12mo, cloth. \$1.25

Concrete, Its Nature and Uses. By GEORGE L. SUTCLIFFE. A Book for Architects, Builders, Contractors and Clerks of Works. 8vo, cloth, illustrated. \$3.00

Modern Shafting and Gearing, and the Economical Transmission of Power. A handbook for power users. By M. P. BALE. 104 pages, 12mo, cloth. \$1.00

Greenhouse Construction: a complete manual on the building, heating, venting and arrangement of greenhouses, and the construction of hot-beds, frames and plant-pits. By L. R. TAFT. Illustrated, 219 pages, 12mo, cloth. \$1.50

Sent, post-paid, on receipt of price, by

DAVID WILLIAMS, PUBLISHER & BOOKSELLER
96-102 READE ST., NEW YORK.

The Art of Coppersmithing.

A Practical Treatise on Working Sheet Copper into all Forms.

BY JOHN FULLER, SR.

CLOTH BOUND, 10 x 7 INCHES, 327 PAGES, 474 ENGRAVINGS.

PRICE, - - \$3.00

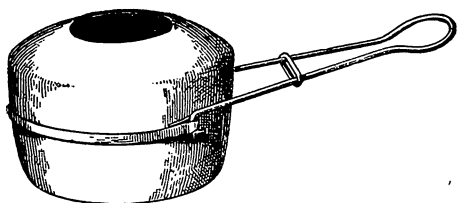


Fig. 108.—Clamp for Holding Tea Kettle while Being Tinned.

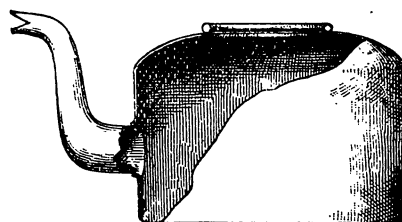


Fig. 110.—Tea-Kettle, Showing Spout Attached.

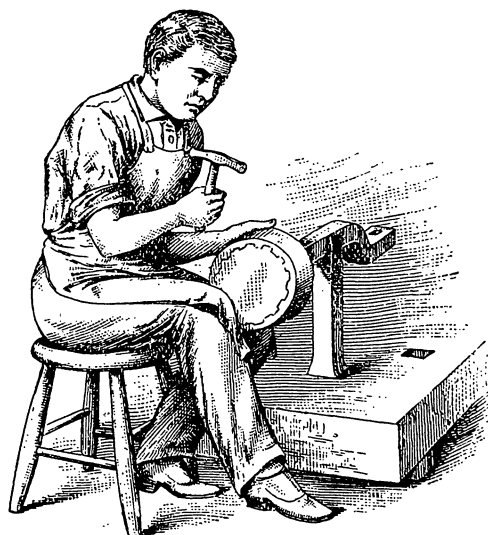


Fig. 107.—Planishing Tea-Kettle Side.

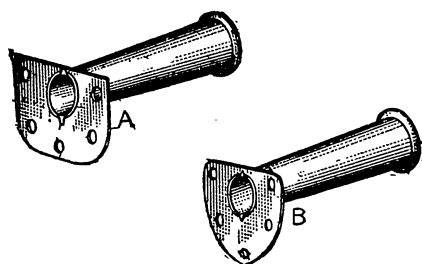


Fig. 54.—Way to Put the Flaps On.

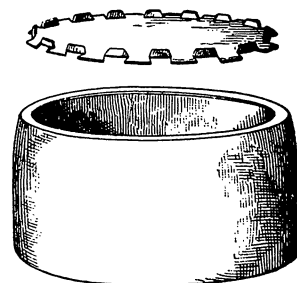


Fig. 105.—Putting in Bottom.

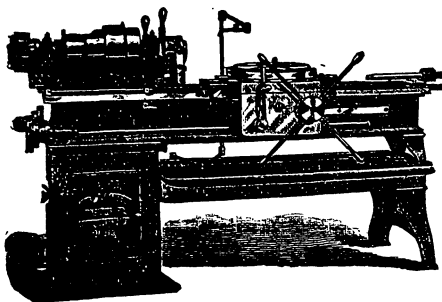
The above are Specimen Illustrations from "The Art of Coppersmithing," and indicate the Practical Nature of the Treatise, and how it Goes into All the Details of Workmanship.

CONTENTS:

Historical Sketch of Copper; Braziers' Art, or Light Coppersmithing; First Year's Experience; Repairing and Tinning; The Boy's Second Year; Making Washing Coppers; Making Small Brewing Coppers; Table of Dimensions and Capacity; Making Hand Bowls; Making Frying Pans; Making Closet Pans; Making Water Balls; Mounting for Copper Goods; Glue Pots and Tea-Kettles; Oval Tea-Kettles; Beer Mullers; Funnels; Coffee Pots; Saucepans and Pudding Pots; Stewpans; Stock Pots; Fish Kettles; Brazing Pans; Tea Boilers; Warming Pans; Preserving Pans; Dripping Pans; Coal Scoops and Coal Hods; Making Coal Scoops; Planishing and Smoothing; Cranes or Syphons; Pumps; Appliances of Railway and Marine Coppersmiths; Making Copper Pipe; Piecing and Joining Pipes; The Fire Pots; Fire Pot Set for Brazing Joint; Soft Soldering Large Joints; Taking Templates; Filling and Bending; Making Bends; Template Boards; Patching Pipes; Outlets; Expansion Joints; Tee Pieces; Three-way Pieces; Cross or Four-way Pieces; Saddle Fire; Marine Work; View of Maudsley, Sons & Field's Shop; Making Large Bends; Making Double Bends; Brazing on Flanges; Short Bends; Air Pipes for Ships; Making Hollow Spheres; Brazing Sheet Brass; Locomotive Brass Work; Brass Dome Covers; Heavy Pipes for Breweries; Brewing Coppers or Kettles; Dome Coppers; Dome and Pan Coppers; Tallow Coppers; Dyers' Coppers; Sugar Tieches; Stills.

—Sent, Postpaid, on Receipt of Price by—

DAVID WILLIAMS, Publisher. 96-102 Reade St., N. Y.



HAVE YOU A

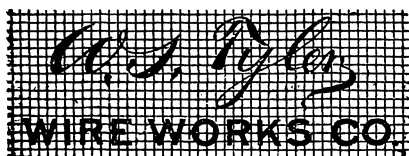
FLAT TURRET LATHE ?

If not send for

RAPID LATHE WORK.

JONES & LAMSON MACHINE CO.,

SPRINGFIELD, VT., U. S. A.



MANUFACTURERS OF

Light Architectural Iron and Wire Work.

GRILLS OF EVERY DESIGN,

In Brass, Iron and Steel, Electroplated, Oxidized and Berlin or Rustless Black.

W. S. TYLER, Pres. PROCTOR PATTERSON, Sec. & Treas.
CLEVELAND, OHIO.

LABORATORIES OF DR. GIDEON E. MOORE,

221 Pearl St., New York.

DEPARTMENT OF CHEMISTRY. Analyses and Assays of Ores, Metals, Waters, Fuel, Oils and Natural and Industrial Products of every description.

DEPARTMENT OF PHYSICAL TESTS. Chas. F. McKenna, Director. Tensile, Transverse and Compression Tests of Iron, Steel and other Metals and Alloys, Cements, Building Stones and Engineering Materials generally. Tests of Lubricating Value of Oils, etc., etc.

PRINTED PRICE-LISTS ON APPLICATION.

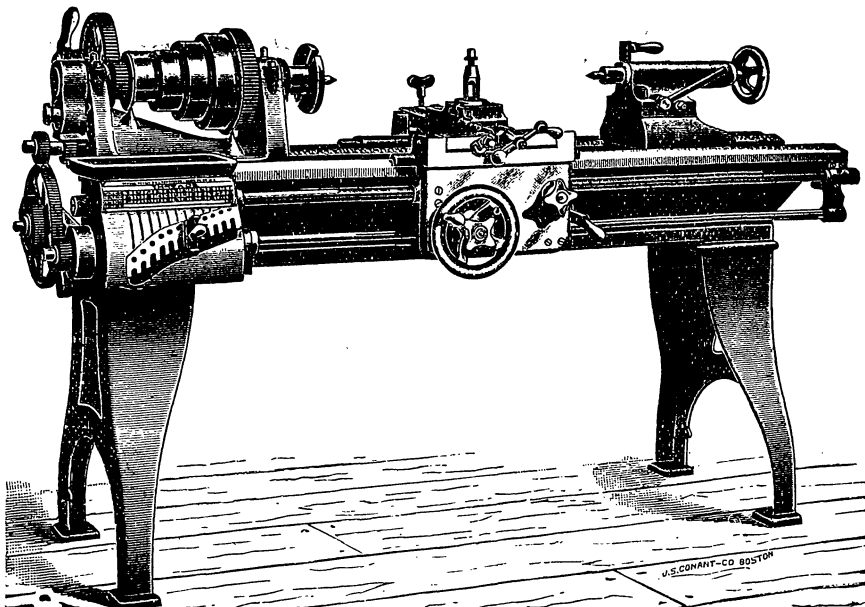
ALUMINUM.

The Pittsburgh Reduction Co.,

701 Ferguson Bock, Pittsburgh, Pa.,

Offer Aluminum guaranteed equal in purity to the best in the market, at lowest rates obtainable.

ALUMINUM SHEET, WIRE,
AND CASTINGS.



The Hendey Machine Co., Torrington, Conn.

A NEW FEATURE IN SCREW CUTTING ENGINE LATHES. THE HENDEY-NORTON LATHE.

This lathe cuts 12 different screws, from 6 to 20, without changing the gears, and feed changes from 36 to 120 cuts per inch without change. This cut shows a 14-inch x 8-foot Lathe. It has hollow spindle, 1-inch. Has compound or elevating rest, as preferred, or the double carriage rise and fall rest. Also taper attachment if desired. The carriage reverses for screw cutting without the use of the countershaft, from the lever at the end of carriage, allowing the spindle to run in one continuous direction. In stock for immediate delivery, 14-inch, 16-inch and 18-inch, 20-inch and 30-inch in the works. Send for descriptive catalogue.

CHAS. CHURCHILL, Ltd., London, England,
SCHUCHARDT & SCHUTTE Berlin, Germany, } AGENTS.
EUGENE SOLLER, Basel, Switzerland,

The Hendey Machine Co., - Torrington, Conn.

A TREATISE ON TOOTHED GEARING.

Containing complete instructions for Designing, Drawing, and Constructing Spur Wheels, Bevel Wheels, Lantern Gear, Screw Gear, Worms, &c. and the proper formation of Tooth Profiles. For the use of Machinists, Pattern Makers, Draughtsmen, Designers, Scientific Schools, &c. With many plates. By J. Howard Cromwell. 12mo, cloth. \$1.50.

Sent, post-paid, on receipt of price by

DAVID WILLIAMS, Publisher and Bookseller,
96-102 Reade Street, NEW YORK.

Do You BORE CYLINDERS ?

THE HORIZONTAL BORING MACHINE

IS A SPECIAL TOOL FOR THIS PURPOSE.

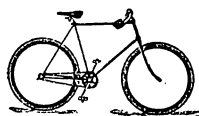
SEND FOR PARTICULARS TO

NEWARK MACHINE TOOL WORKS
NEWARK, N. J.

J. A. FAY & Co., CHICAGO, WESTERN AGENTS.

THE eyes of the Bicycling World are on J. S. Johnson, the Stearns Champion, whose wonderful feats are the feature of every meet. Johnson rides the Stearns Bicycle and it carries him to victory.

E. C. Stearns & Co., Syracuse, N. Y.



ECLIPSE BICYCLES.

MODEL A	- -	\$125.	MODEL B	- -	\$100.
LADIES'	- -	125.	LADIES' F	- -	100.
MODEL E	- -	85.	LADIES' D	- -	85.

Each Model the best value at its price. Six Thou-and Riders of our 1894 machines can testify to their excellent qualities. Liberal prices to the Hardware trade.

S. A. HAINES, Indianapolis, Ind., Selling Agent to Hardware Jobbers.

ECLIPSE BICYCLE COMPANY, - Beaver Falls, Pa.

THE WILLIAMS PRINTING CO.,

Commercial Printers and Binders.

ESTIMATES FURNISHED FOR ALL CLASSES OF WORK.

96, 98, 100 and 102 READE STREET, - NEW YORK.

WHITE MOUNTAIN FREEZERS.

**THE
BEST
FREEZER.**

Heavy Waterproof Tubs. Cans of Charcoal Tinplate. Malleable Iron Dashers. All inside parts tin-plated. Gearing completely covered.

Inquire of any leading jobber or write us.

**THE
BEST
SELLER.**

The White Mountain Freezer Co., Nashua, N. H.



The true test of a Freezer is how well it performs its work; in this respect the unsolicited testimony of thousands pronounce the "Packer Freezers" unexcelled.

**GOOD LUCK, STANDARD,
AND CONFECTIONERS' MACHINE FREEZERS.**

The "Good Luck" is the latest and best low price Freezer on the market. Inside Castings Tinned, Malleable Iron Fittings, Automatic Scraper. White Cedar Pails with Galvanized Steel Hoops. Pine Pails, or Wire Rings with bottom of pail unprotected are not used.

CHAS. W. PACKER, Mfr., 20 N. Fourth St., Philadelphia.

GATE HINGES AND LATCHES.

BLIND and SHUTTER HINGES

And FRAME PULLEYS of the

Original "Clark" and other patterns formerly sold by

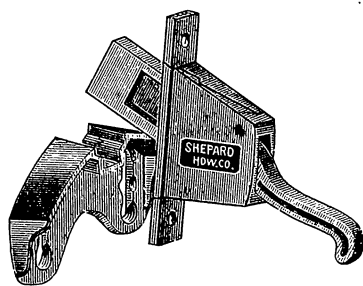
THE SHEPARD HDW. CO. of Buffalo,

whose business in these lines we have acquired by purchase.

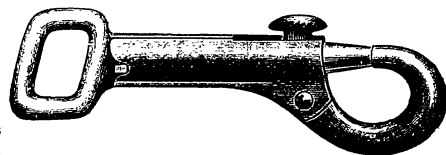
MANUFACTURED ONLY BY

THE WRIGHTSVILLE HARDWARE CO.,

WRIGHTSVILLE, PA.



COVERT' BANNER BOLT SNAP.



This snap has many important advantages over other makes of Bolt Snaps, viz.: It is lighter, the spring is entirely covered and protected from foreign substances and freezing, and is lower in price.

Made in all sizes: Round, Loop and Open Eye. We are headquarters and the most extensive manufacturers in Saddlery, Coach and General Hardware Specialties.

**Covert's Saddlery Works,
FARMER, N. Y., U. S. A.**

**Hardware Dealers
Can Profitably
SELL BICYCLES.**

There is a large trade in Bicycles in all parts of the country and much of that trade naturally belongs to dealers in hardware. Good bicycles meet with a ready sale and pay a fair percentage of profit.

COLUMBIAS

Are the representative high grade machines in America. A Columbia is the easiest machine to sell to the best trade because it is unquestionably the standard wheel of the world.

We want enterprising agents of good standing and solicit correspondence.

**Pope Mfg. Co.,
221 Columbus Ave.,
Boston, Mass.**

INSTRUCTION BY MAIL

In Architecture, Architectural Drawing, Plumbing, Heating and Ventilation, Bridge Engineering, Railroad Engineering, Surveying and Mapping, Electrical Engineering, Mechanical Drawing, Mining, English Branches, and

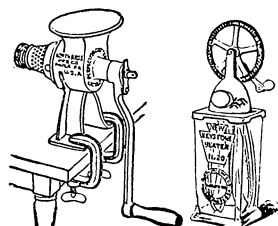
MECHANICS.

Diplomas awarded. To begin students need only know how to read and write. Send for FREE Circular of Information stating the subject you think of studying to THE CORRESPONDENCE SCHOOL OF MECHANICS AND INDUSTRIAL SCIENCES, Scranton, Pa.

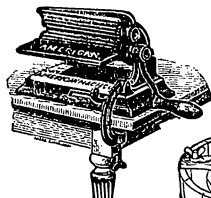
4000 STUDENTS.

SEASONABLE HELPS

FOR HOUSEHOLD USE.

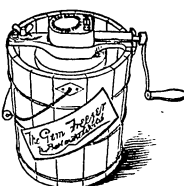


New Perfection Cutter.

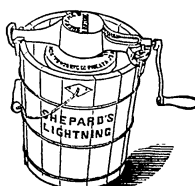


American Fluter.

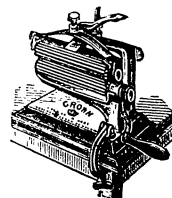
PRE-EMINENTLY
THE BEST IN
DESIGN,
MATERIALS,
WORKMANSHIP,
PRACTICAL USE.



WHITE CEDAR
PAILS WITH

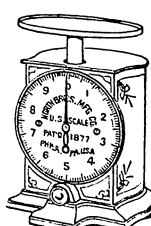


Electric-Welded Wire Hoops.
Guaranteed not to fall off.



Crown Pluter.

SOLD BY
THE BEST
JOBBER AND
RETAIL HOUSES
IN THE U. S.



U. S. Dial Scale.

For Particulars, Prices and Discounts, Write **NORTH BROS. MFG. CO., Philadelphia, Pa.**

NEW YORK AGENTS,
John H. Graham & Co.
113 Chambers St.

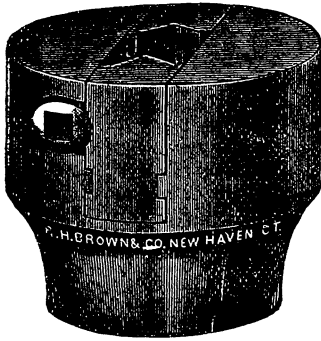
REID DRILL CHUCKS.

THREE SIZES.

No. 0 takes any drill from 0 to 1-2 inch inclusive.

No. 1 " " " " 0 " 3-4 " "

No. 2 " " " " 0 " 1 " "



They are the strongest and most durable made. Drill absolutely in the center. No twisting or bending necessary if drill is straight. Can be fitted to hollow spindle lathes for working long rods.

SEND FOR CIRCULAR.

R. H. BROWN & CO., - New Haven, Conn.

*You take no risk on the quality
We make only the best!*



Sand Papers { Flint Paper
Garnet Paper
Emery Paper
Emery Cloth
IN Reams and Rolls

HAIR FELTING for covering Boilers, Steam and Water Pipe, and lining Refrigerators.

BAEDER, ADAMSON & Co.

730 MARKET STREET, PHILADELPHIA.
67 BECKMAN STREET, NEW YORK.
143 MILK STREET, BOSTON.
182 LAKE STREET, CHICAGO.

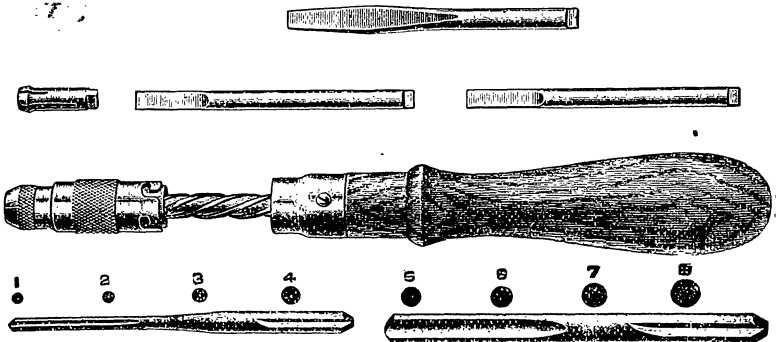
Palmer's Common Sense Frame Pulley



MANUFACTURED BY

PALMER HARDWARE MFG. CO., Troy, N.Y.

MILLERS FALLS Automatic Screw Driver.



This tool is much like others of the same class, but is more highly finished and better made than any heretofore put on the market. It has one addition which is nearly indispensable for satisfactory work, that is, a patent revolving sleeve which the left hand grasps when the tool is working. While this sleeve is a great advantage in driving screws, it also enables the tool to be used as an automatic drill. The only additional expense is for the drill points. There is also a locking device which prevents the screw driver from falling out of engagement when held perpendicular. All the metal parts are highly polished and heavily nickel plated. The handle is of Cocobola. Full length extended, 17 inches. The three screw driver bits which go with each tool are 4 inches long, and made to fit screws of varying sizes.

Price of No. 11, without Drill Points, but with three screw driver bitsper dozen \$15.00

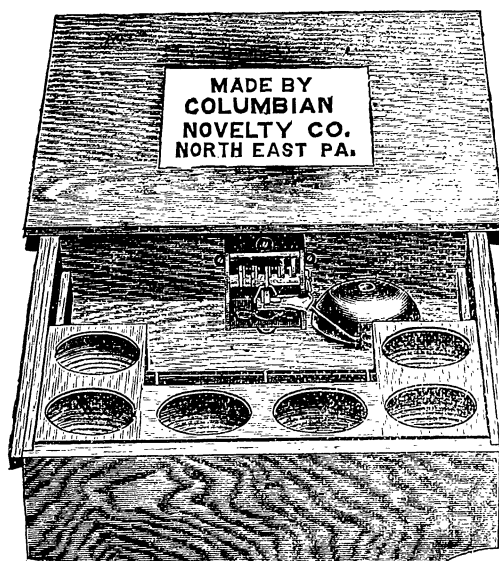
" " 12, with 8 Drill Points and 3 screw driver bits..... " 21.00

Packed one in a box.

MILLERS FALLS CO.,
93 READE STREET, - - - - , NEW YORK.

"GEM"

Alarm Lock
Cash Till.



This Cash Till is beyond question the best Till for the purpose on the market, combining as it does a greater number of changes, simplicity and convenience, and above all, superior workmanship and material in its construction.

Packed one-half dozen in crate.

Prices quoted on application.

CABINET LOCKS

OF EVERY KIND.

DRAWER LOCKS,

CUPBOARD LOCKS,

WARDROBE LOCKS,

CHEST LOCKS,

DESK LOCKS.

A complete line of more than 1000 list numbers exclusive of our old and complete line of

YALE CABINET LOCKS.

THE YALE & TOWNE M'F'G CO.,

STAMFORD, CONNECTICUT.

New York. Chicago. Philadelphia. Boston. Pittsburg. San Francisco.

The only question is

Is it Le Page's?

If it is you have made a sale. **HUNDREDS of THOUSANDS of PLEASED and SATISFIED CUSTOMERS** testify to the merits of

LE PAGE'S LIQUID GLUE.

If you sell it you do not have to **WASTE ANY TIME** in answering questions as to its quality.

The people **KNOW** that **LE PAGE'S GLUE** is the **BEST**. They have used it for years and have proved our claims to be true.

It is the only Glue made **WITHOUT ACIDS**.

A dealer who regards his time as worth anything will not risk losing his **CUSTOMERS' CONFIDENCE** by trying to sell something which is **CLAIMED** to be "just as strong" and "just as good as LePage's."

Don't let your customers go to another store for what they want, but **SELL THEM WHAT THEY ASK FOR**.

We can furnish original and attractive advertising matter for "**LE PAGE'S GLUE**" upon request.

SEND FOR CIRCULARS AND PRICE-LIST.

RUSSIA CEMENT CO, Gloucester, Mass.

NEW YORK OFFICE, 95 Reade and 113 Chambers Streets.

PACIFIC COAST OFFICE, 23 Davis St., San Francisco, Cal.

AN ELEGANT TRADE CATALOG

Attracts attention and makes customers. The addition of a highly artistic Embossed Cover creates a good impression at first glance. Our business is to design and make catalogs complete, including engravings.

GRIFFITH,
AXTELL &
CADY CO.
Holyoke, Mass.

Send six cents in stamps for our catalog "E," showing original Embossed Cover designs. **DESIGNERS PRINTERS EMBOSSEERS**

Law without Lawyers.

A Compendium of Business and Domestic Law for Popular Use.

By **H. B. COREY,**
Member of the New York Bar,

PRICE, \$1.00. Post-paid.

A simple, clear and accurate presentation of the general laws, and of the laws of the several States relating to the rights of property, contracts, debts, partnerships, bankruptcy, insurance, corporations, marriage, divorce, &c., &c., with which are included correct copies of all legal instruments and forms, such as notes, deeds, mortgages, leases, wills, &c., and a dictionary of legal words and phrases.

Sent, post-paid, on receipt of price, by

DAVID WILLIAMS,

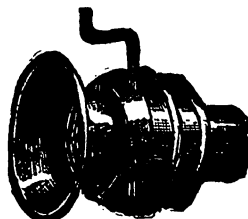
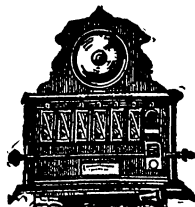
Publisher and Bookseller,

96 - 102 Reade St., New York.

W. R. OSTRANDER & CO.,

204 FULTON STREET, NEW YORK,
Manufacturers ofSPEAKING TUBES, WHISTLES, ORAL, ELECTRIC
MECHANICAL AND PNEUMATIC ANNUNCIATORS
AND BELLS.

Complete outfits of Speaking Tubes, Whistles, Electric, Mechanical and Pneumatic Bells. A full line always in stock. Send for new catalogue. Factory, DeKalb ave. near Knickerbocker, Brooklyn, N. Y.



H

W. & B. DOUGLAS, MIDDLETOWN, CONN.

Branch Warehouses: 85 and 87 John St., New York; 197 Lake Street, Chicago, Ill.

THE OLDEST AND MOST EXTENSIVE MANUFACTURERS OF

Pumps, Hydraulic Rams, Garden Engines,

Yard Hydrants, Street Washers, Galvanized Pump Chain, Wind Mill Pumps and other Hydraulic Machines in the World.

DOUGLAS' DIAPHRAGM PUMPS, "Loud Patent."

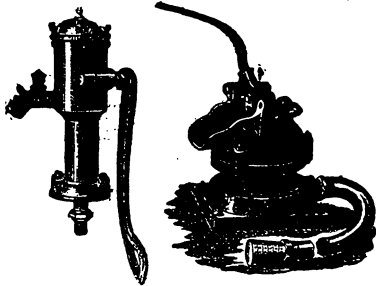
A LARGE CAPACITY AND EASY WORKING PUMP FOR

Water Works, Sewer Contractors, Foundation Builders, Mines, Quarries;

Fig. 209.

Fig. 381.

Fig. 145.



or wherever it is desired to raise a large quantity of water by
hand power.

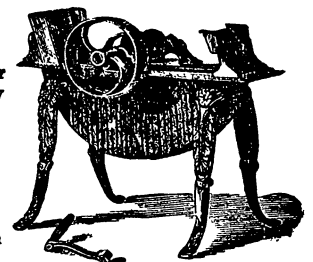
The pump has large valves (accessible by hand), and will pump water containing sand, gravel, sewage matter, &c., without choking or any perceptible wear.

CAPACITY

from 3,000 to 4,500 gallons per hour.

These pumps are simple, durable and low priced.
Made either as shown in cut for Hose or for **IRON** Pipe Suction underneath.

Send for Circular and Price List.



C. I. Grindstone Frame.

THE DEMING
FACTORY
SALEM O.S.A.
MANUFACTURERS OF
HAND & POWER
PUMPS,
WELL
SUPPLIES
& C. VERTICAL STEAM PUMPING
ENGINES
N.Y. OFFICE
72 JOHN ST.
HENION & HUBBELL
GEN'L WESTERN AGT.
55 & 57 N. CLINTON ST.
CHICAGO, ILL.

ARTESIAN
WELL
CYLINDERS
HYDRAULIC
RAMS

PRENTISS' PAT. VISES.

The Leaders for 20 Years.

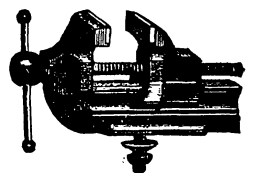
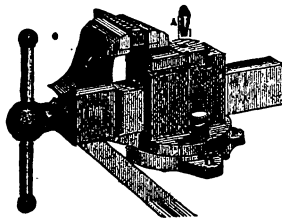
Send for Illustrated Catalogue
of

ALL KINDS OF VISES.

PRENTISS VISE COMPANY,

MANUFACTURERS,

44 Barclay St., New York.



"NOT TOO NEW, BUT JUST NEW ENOUGH!"

TESTED BY SEVERAL YEARS OF POPULARITY WITH THE TRADE.

SAVES

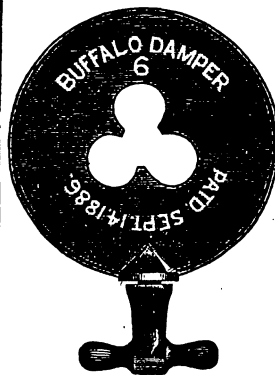
TIME AND TEMPER.

SIMPLE,

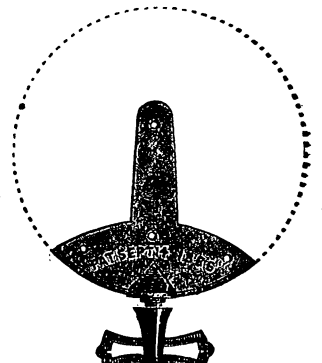
SINGLE BEARING,

EASILY PUT IN.

ONLY ONE HOLE IN PIPE.



THE BUFFALO DAMPER.



THE BUFFALO DAMPER CLIP.

THE BUFFALO DAMPER CLIP IS

BETTER THAN THE NEWEST AND AS CHEAP.

ALL DAMPERS or DAMPER CLIPS supplied with wood or metal handles, as desired.

—SOLE MANUFACTURERS—

SIDNEY SHEPARD & CO., C. SIDNEY SHEPARD & CO.,

BUFFALO, N. Y.

CHICAGO, ILL.

CHAS. W. WELLS, New England Sales Agent, 19 Pearl St., BOSTON, MASS.

SAMPLE ORDERS SOLICITED.

F.E. MYERS & BRO.

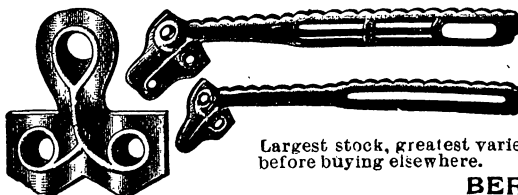


+ CATALOGUES FREE +

Ashland Pump and Hay Tool Works.

The New York Safety Dumb Waiter.
The Manhattan Dumb Waiter.
The Improved Humphrey Hana Elevator.
Made specially to be sold by Hardware Stores.
Thousands in use. Catalogues on application.

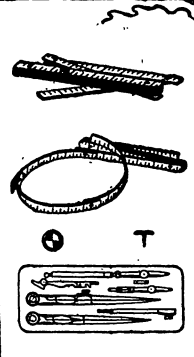
THE STORM MANUFACTURING CO.
NEWARK, NEW JERSEY.
Formerly of Poughkeepsie, New York.



HEADQUARTERS FOR
**TINNERS' HARDWARE &
ROOFERS' SUPPLIES.**

Largest stock, greatest variety. Prices lower than ever. Write us
before buying elsewhere.

BERGER BROS., Philadelphia.

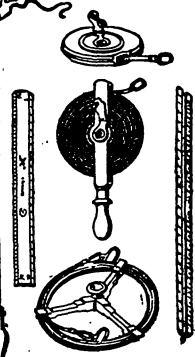


KEUFFEL & ESSER CO. +NEW YORK.+
BRANCH: CHICAGO.
+FACTORIES: HOBOKEN, N.J.+

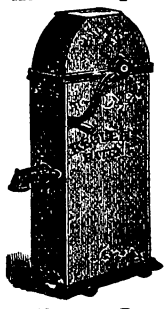
MANUFACTURERS OF EXCELSIOR MEASURING TAPES.
SUPERIOR QUALITY, LATEST IMPROVED. GREATEST VARIETY.
—STEEL—METALLIC—LINEN—POCKET TAPES.—
EXCELSIOR BAND CHAINS FOR SURVEYORS, LAND CHAINS, &c.

K & E CO FOLDING POCKET RULES.
NO WARPING, NO SHRINKING, NO ILLEGIBLE JOINTS, NO BULK.
2 3.4 5.6.8 FOOT, ALSO WITH PATENT SPRINGS.
—FLAT & TRIANGULAR BOXWOOD SCALES, BEST MADE.—
—PLUMB BOBS, THUMB TACKS, DRAWING INSTRUMENTS.—

PRICE LISTS & QUOTATIONS PROMPTLY SENT.



IRON INSTEAD OF WOOD.
GALVANIZED IRON
TUBING and CURB,
—FOR—
CHAIN PUMPS,
(Kegler's Patent)
Are Giving Universal Satisfaction,
BECAUSE:



They do not rust and accumulate filth—always clean. Extreme lightness is combined with strength and durability. No freezing. No waste of water by reason of enlarged reservoir at top of tubing. No annoying wheel at bottom. Easy to handle.
Tubing weighs less than 1/4 lb. per ft., is connected by couplings and can be attached to any make of curb.

Send for Catalogue.
Bellevue Pump Co., Bellevue, Iowa.



Athol Machine Co.,
Selling Agents.

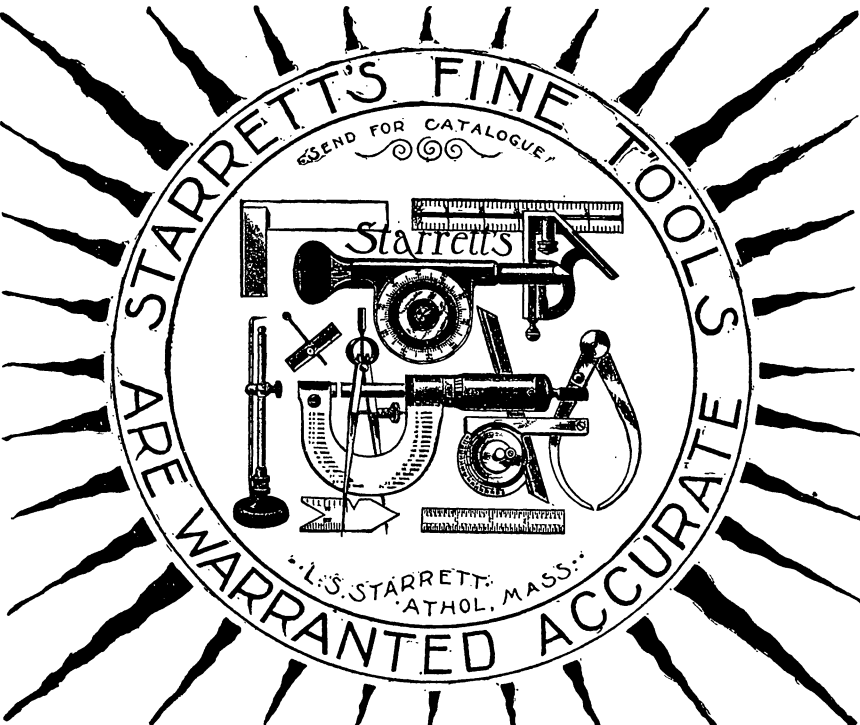
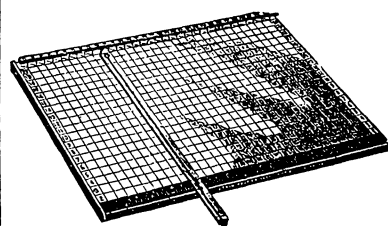


HOLLANDS' OFFSET JAW VISE.

Specially adapted for drill press work where chucks cannot be used and equally good for special or regular bench work.

Hollands Mfg. Co.,
ERIE, PA.,
Manufacturers all styles VISES.

THOMAS CLARKE
HARDWARE AND GENERAL AGENT.
(FIRST-CLASS REFERENCES.)
60 PRINCE WILLIAM ST., ST. JOHN,
NEW BRUNSWICK.

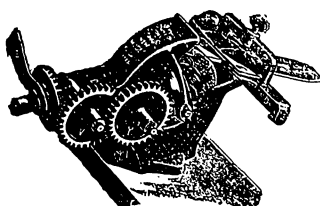
The PERFECTION GLASS BOARD.

The best, most complete, most durable and most convenient Glass Cutting Board in the market. It is indispensable to any retailer of window glass, and will save its cost in a very short time. Send for descriptive circular and price.

LUFKIN RULE CO., Saginaw, Mich.

New York Office, 2 1/2 Murray Street.

CLIPPER GRINDERS.

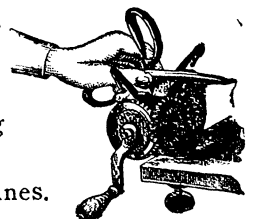


We make five sizes, Nos. 1, 2, 3, and 5.

No. 1 for joiners' use.

Nos. 2 and 3 for grinding scissors and knives.

Nos. 4 and 5 power machines.



SEND FOR SPECIAL CIRCULAR TO

THE A. J. TRACY CO., Lim.,

18 Cliff St., New York, N. Y.

GEO. N. CLEMON, Pres.

S. S. BATTIN, Vice-Pres.

ROBERT J. JOHNSON, Treas.

F. B. EARLE, Sec.

THE NATIONAL SAW CO.,

OPERATING

Wheeler, Madden & Clemson Mfg Co., Wood-rough & McParlin, Richardson Brothers, Harvey W. Peace Co., Monhagen Steel Works, Wood-rough & Clemson, Pennsylvania Saw Co.

SEND FOR PRICE-LIST.

GENERAL OFFICE:

NEWARK, - - New Jersey.

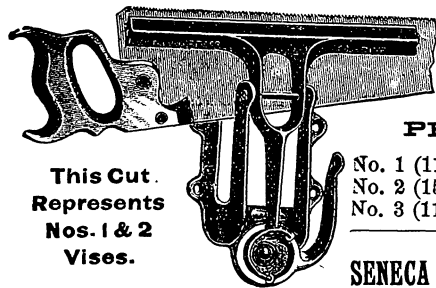
SAWS

WENTWORTH'S PATENT NOISELESS SAW VISES,

WITH RUBBER CUSHIONED JAWS.

Prevent all vibration and render Saw Filing noiseless.
Will make no more noise than Filing on a Solid Piece of Iron.

Have a Larger Sale than All Other Kinds Combined.



This Cut
Represents
Nos. 1 & 2
Vises.

PRICE LIST.

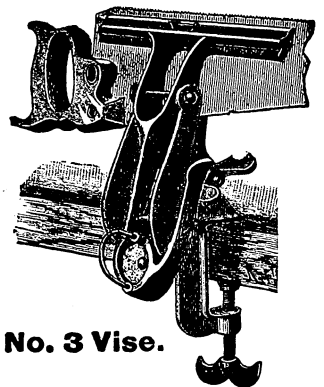
	PER DOZ.
No. 1 (11 inch Jaws),	\$15.00
No. 2 (15 inch Jaws),	21.00
No. 3 (11 inch Jaws),	18.00

LIBERAL DISCOUNT TO THE TRADE.

LONGEST JAWS, HEAVIEST AND
BEST FINISHED.
Sold by all leading jobbers of gen-
eral Hardware at Factory Prices.

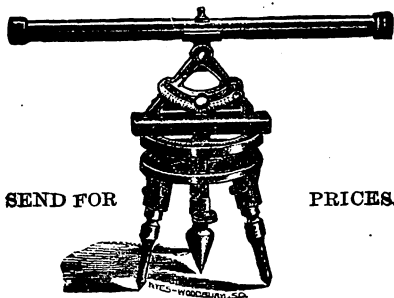
—MANUFACTURED BY—

SENECA FALLS MFG. CO., 255 Water St., Seneca Falls, N. Y.



No. 3 Vise.

ARCHITECTS' & CARPENTERS' TRANSIT,



SEND FOR

PRICES.

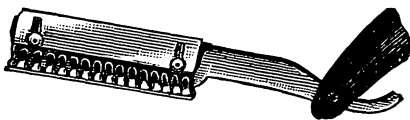
C. F. RICHARDSON & SON, Athol, Mass.
Manufacturers of Iron Levels
and Leveling Instruments.

— REMEMBER —

WE MAKE ONLY

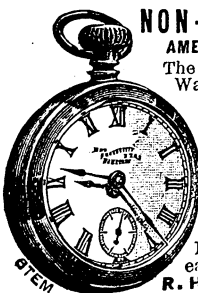
The Very Highest Grade
OF
MECHANICS' TOOLS.

H. H. MAYHEW CO., Shelburne Falls, Mass.



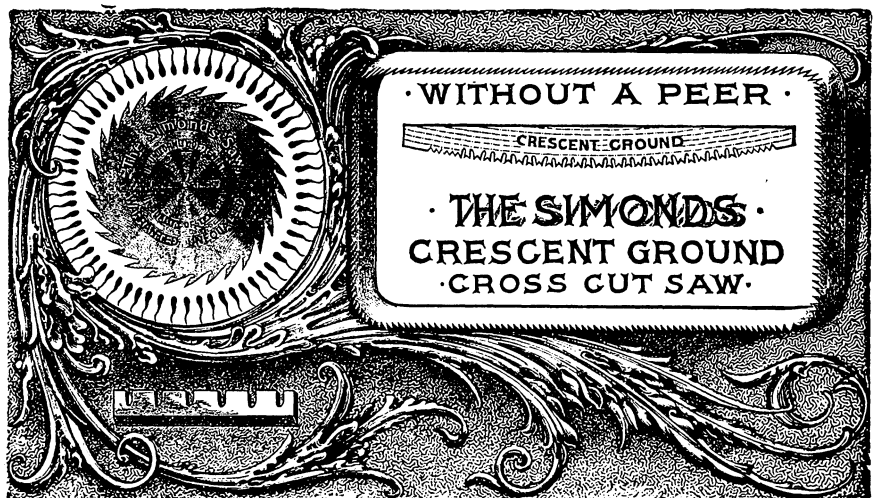
This Guard is the only Guard made that will fit any razor, and can be used right or left handed and never gets out of order. Price by mail 30c. Special prices to dealers.

P. D. MURPHY, 75 Main St., Lockport, N. Y.



NON-MAGNETIC \$2.00
AMERICAN WATCH.

The Premium Non-Magnetic Watch has a specially constructed American Lever Movement, in Case of non-conducting metal, and is fully warranted to withstand any attempt at magnetization, and to keep accurate time around or against a dynamo. Every dynamo hand wants them. Mailed postpaid for \$2.00 each; 3 for \$5.; 1 doz., \$18.00
R. H. INCERSOLL & BRO.,
65 CORTLANDT STREET, NEW YORK.



· WITHOUT A PEER ·

· CRESCENT GROUND ·

· THE SIMONDS ·
· CRESCENT GROUND ·
· CROSS CUT SAW ·

Simonds Mfg. Co. Simonds Saw Co.

FITCHBURG, MASS. CHICAGO, ILL. SAN FRANCISCO CAL. PORTLAND, ORE.

The Taintor Positive Saw Set.

Mechanics are now inquiring for this tool, and Hardware Dealers should have them in stock, or at least have a sample.

For Prices and Discounts, address

WIEBUSCH & HILGER, LTD., SOLE AGENTS,

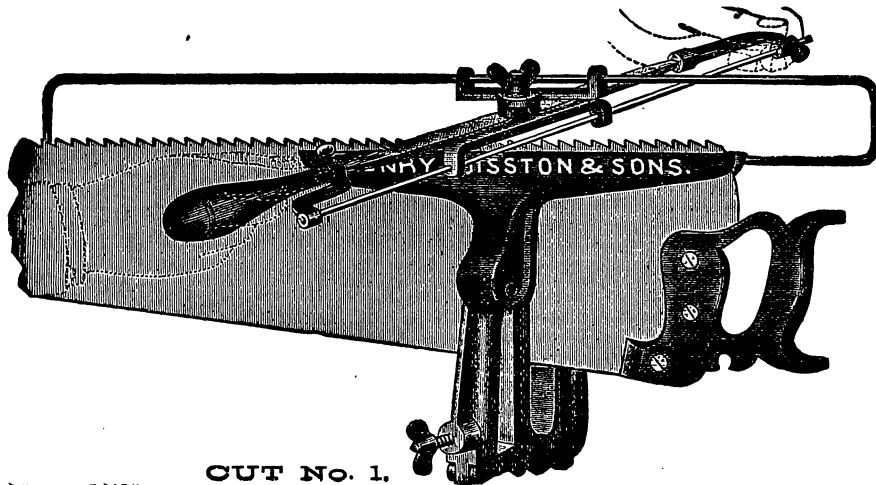
84 and 86 Chambers Street,

NEW YORK.



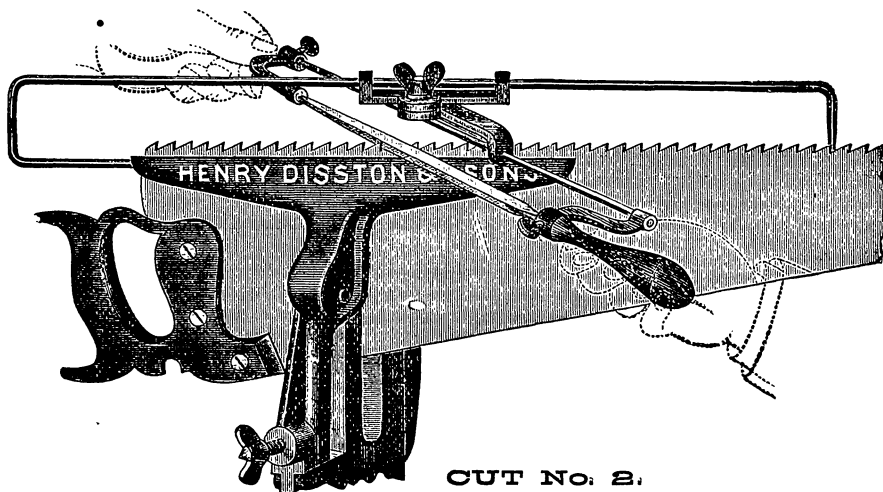
DISSTON'S Improved Saw Clamp AND FILING GUIDE.

ESPECIALLY DESIGNED TO ASSIST THOSE NOT SKILLED IN THE ART
OF SAW FILING TO FILE A SAW CORRECTLY.



CUT No. 1.

Cut No. 1 shows a saw and the attachment in proper position for filing the first side; and Cut No. 2 shows the saw and attachment reversed and in position to file the second side. There are three marks on one of the hubs of the swivel attachment, and one mark on the other. One of the three marks shows when it is in position No. 1, and the other designates when it is in position as shown in No. 2. The third, or centre, marks show when it is in position for filing Rip Saws.



CUT No. 2.


To obtain the correct position, loosen the wing nut and move the guide around to the point desired; after tightening wing nut, loosen screw in file handle, then turn handle until file gives the shape tooth wanted.

A good way is to select a tooth of correct shape and let file down into it, tighten set screw in handle, then file a tooth to see if the shape suits. If not turn the file a little to the right or left and try another tooth until the proper shape is obtained. Then file every other tooth, see cut No. 1; when one side is filed, reverse saw and attachment and adjust as in No. 2, and file the other teeth. For Rip Saws, place the file at right angles with the saw and file every tooth. Always keep the file as nearly horizontal as possible.


This filing guide is sold only attached to our No. 3 Improved Clamp or Vise, and not sold separately. We recommend this as the best saw clamp on the market, being quickly and easily adjusted, and not liable to get out of order.

Write for price including No. 3 Clamp, Filing Guide, File and Handle complete: Packed one in a wooden box.

Henry Disston & Sons, Philadelphia, Penn. INCORPORATED.



ARCADE FILE WORKS.



WARRANTED FILES AND RASPS.

EASTERN OFFICE.
NEW YORK.

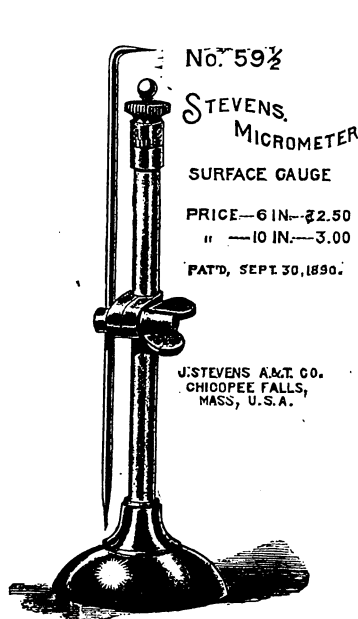
FACTORY,
ANDERSON, IND.

WESTERN OFFICE,
CHICAGO.

THE FILES THAT LEAD THEM ALL

THE BEST EQUIPPED FILE WORKS IN THE WORLD.

The fact that the Arcade File Works alone use the improved File Machinery recently invented by Alfred Weed, and the even heat of natural gas, enables them to produce files that cut faster and wear longer than any on the market.



FINEST MECHANICAL TOOLS.

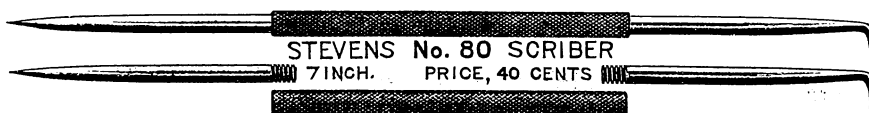
SELL ONLY THE
BEST.



J. Stevens Arms & Tool Co.,

P. O. BOX, 5729,

Chicopee Falls, - - Mass



HOW TO KEEP A STORE.

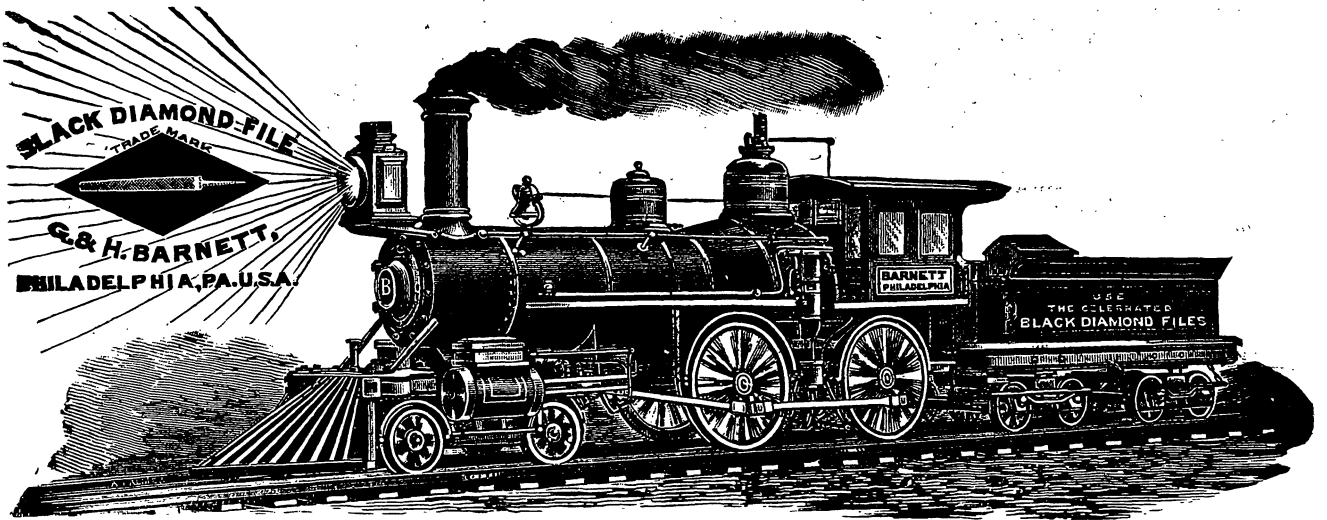
By S. H. TERRY.

406 PAGES, 5x7 1/2 INCHES.

This book should be in the hands of every one interested in the selling of goods at retail. Among the subjects discussed are: The selection of a business; choice of a locality; buying a stock of goods; examining, marking and arranging goods; how to advertise; employment of clerks; selling for cash and credit; keeping accounts; expenses; copartnerships; losses by fire, theft, &c.; influences of social life on business; buying at auction; investment of profits; insolvency; business qualifications. Every branch of the retail trade is treated upon in a direct, business-like manner. It is a thoroughly practical book for merchants and clerks. **Price, \$1.50.**

Sent, Post-paid, on Receipt of Price, by

DAVID WILLIAMS, - - - **Publisher and Bookseller,**
96-102 Reade Street, New York.



THE LARGEST AND MOST COMPLETE FILE WORKS IN THE WORLD.

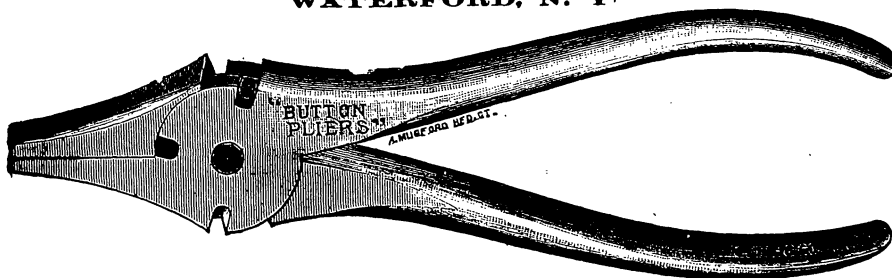
NICHOLSON FILE CO.

PROVIDENCE, R. I.

3000 VARIETIES FILES [X.F.] AND INCREMENT CUT FILES

J. M. KING & CO.,
WATERFORD, N. Y.

Manufacturers of
BUTTON'S



Pat. Wire Cutter
AND PLIER COMBINED.

Specially Adapted for Use on Wire Fence.

Also Manufacturers of BLACKSMITHS' and MACHINISTS' STOCKS and DIES, PLUG and TAPER TAPS, HAND, NUT and SCREW TAPS, PIPE TAPS and REAMERS.

Price-List on Application.

Established by DANIEL B. KING, 1829.

Philadelphia, 1876.



McCaffrey File Co.,
FIFTH and BERKS STS.,
PHILADELPHIA, PA.

For Superiority



Manufacture and keep in stock a full line of FILES and RASPS only, for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade.
Superiority acknowledged wherever used, sold or exhibited.

BEST
CRUCIBLE
STEEL.

"TROJAN" HORSE RASPS AND FILES.

LOWEST
IN
PRICE.

STRONGEST
TOOTH

BANKER & WHITE,
(Troy File Works.)

TROY, N. Y.

LET
US
QUOTE.

N. Y. Agent, GEO. M. MATTESON, 111 Duane St.

HOWARD IRON WORKS.
BUFFALO, N. Y.

Manufacturers of

BENCH VISES.

Price Lists sent on application.



WM. KROGSrud,
Engraver and Die Sinker,
61 Fulton St., N. Y.
Manufacturer of
STEEL STAMPS
For Every Purpose.
Steel Letters and Figures.
Burning Brands, Stencils
&c. Send for Illustrated
Catalogue.



NICKLE, Silver and Bronze Metallo
Figures and Letters, Sizes 1/16 in to 3 in.
Pattern Letters, Steel Stamps, Brands.
Dies &c. Send for Reduced Price List.
We make a specialty of the Hardware Trade.
A. A. WHITE & CO., Providence, R.I.

TRADE MARK



John Wilson's Butchers' Knives and Steels, Skinning, Sticking, Farriers' & Shoe Knives,

Have established and maintained their reputation, for superiority,
against all Competitors, from

THE YEAR SEVENTEEN HUNDRED & FIFTY,
and are still in increasing demand. As in the past, it is the unalterable
DETERMINATION OF THE HOUSE TO SEND OUT NOTHING BUT WHAT IS OF THE HIGHEST POSSIBLE QUALITY.

WORKS: SYCAMORE STREET, SHEFFIELD, ENGLAND.

SOLE AGENTS FOR THE UNITED STATES,

Messrs. Hermann Boker & Co., 101 and 103 Duane St., New York.

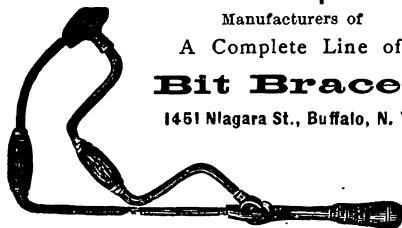
The Amidon Tool Corporation,

Manufacturers of

A Complete Line of

Bit Braces

1451 Niagara St., Buffalo, N. Y.



CORNER BRACE.

AMERICAN TOOL COMPANY,

NEW YORK,

MANUFACTURERS OF

TOOL CHESTS

Of all sizes, complete with tools, for Hardware, Toy,
Notion and Variety trades.

Factory and Salesroom,

200 West Houston Street, near Varick.
Also Machinists' Tool Chests, empty. Illustrated Cata-
logue and prices furnished on application.

WRITE TO

The Bourke Manufacturing Co.,

YOUNGSTOWN, OHIO,

For catalogue and discounts on

Ventilating Sash Lock and Fastener,

Diagonal Sash Lock and Fastener,

Extension Handle Couplings,

Galvanized Iron Window Cleaners,

Floor Scrubbers and Dryers,

Excelsior Bar Cleaners,

Combination Brush, Mop and Sponge Holder.

F. S. HUTCHINSON CO.,

Paragon Self-Retaining Dumb Waiters,

HAND AND BELT POWER ELEVATORS,

Aldrich Building, 32 Warren Street,

NEW YORK.

CATALOGUES AND QUOTATIONS

Our System for Filing is the Simplest
and Most Complete. Write for De-
scriptive Matter, Price-List and
Testimonials.

The Folding Paper Box Co.,
SOUTH BEND, INDIANA.

We make all kinds of Paper Boxes, Cartons, Fold-
ing Boxes and Regular Work.

Boxes Made Absolutely Secure
BY USING THE PORTABLE
BOX BANDER

ONE MAN CAN BAND
YOUR BOXES QUICKER THAN TWO
MEN CAN IN ANY OTHER WAY.

HOOP IRON, WIRE OR ANY OTHER FLEXIBLE MATE-
RIAL CAN BE USED EQUALLY WELL. Send for price

SOON PAYS FOR ITSELF J.W. GOODELL - BURLINGTON, VT.

ESTABLISHED 1816.

WHITE, VAN GLAHN & CO.,

CHATHAM SQUARE NEW YORK,

HARDWARE JOBBERS.

Lawn Mowers, Farming Tools and Barb Wire, W. V. G. & Co. Stovels, Spades and
Scoops, Wire Goods, Brush Makers' Bits, Chinese Gongs.

— SOLE U. S. AGENT, FOR —

J. B. Addis' Wood Carvers' Tools.

SICKELS, SWEET & LYON,

Wholesale Hardware.

Office, 35 Barclay St. Warehouse, 40 Park Place, New York.

Carry Stock of Jackson, Mich., Farming Tools

Shipments from Factory if preferred.

N. Y. AGENTS FOR

Cortland Door and Window Screen Co., Union Steel Screw Co., Eagle
File Co., Perfection and New Easy Lawn Mowers.

Spring Catalogue No. 7 issued in February.

SHARP TOOLS are a NECESSITY to a good workman,

But without a GOOD WHETSTONE they are an impossibility.

That is why it is always economy to buy

PIKE'S WHETSTONES.

Pike's Indian Pond Scythe Stone, Strong, Sharp
Grit, Quick Cutting.

Scythe Stones.

Oil and Water Stones.



GREEN MOUNTAIN,
LAMOILLE,
BLACK DIAMOND,
PREM. QUINNBERG,
WHITE MOUNTAIN,
GENUINE RAGG,
WILLOUGHBY LAKE.

WASHITA,
ARKANSAS,
HINDOSTAN,
WATER-OF-AVR,
RAZOR HONES,
TABLE HONES,
AXE STONES, ETC.

THE PIKE MFG. CO., - Pike Station, N. H.

DIRECTIONS FOR USING

WILLIAMSON'S NEW POWER CORK SCREWS.

KEEP ON TURNING, DO NOT PULL.

No. 1243, Nickel Plated, Apple Wood Handle, \$5.00 per dozen.
1443, " " " Rosewood 5.50

For Discounts and Prices of other styles send for Catalogue.

C. T. WILLIAMSON WIRE NOVELTY CO., NEWARK, N. J.

Manufacturers of Wire Specialties for the Trade.





WHOLESALE HOUSES

Having special brands of razors may contract with us for their manufacture at close figures.

WE CAN DUPLICATE ANY IMPORTED RAZOR, BOTH IN QUALITY AND PRICE. Submit samples and get our prices. They will be low enough to interest you.

J. R. TORREY RAZOR CO., P. O. Box 1015,
WORCESTER, MASS.

"Stamped with the BUCK'S HEAD."



BUCK BROTHERS, MILLBURY, MASS.

The Most Complete Assortment in the U. S. of
Shank, Socket Firmer and Socket Framing
Chisels, Fine Bevel Edge Chisels, Plane Irons

TWO PRIZE MEDALS,

No. 1098 and No. 1099, AT WORLD'S FAIR.

Buyers are cautioned against any parties who claim a recent connection (or any connection for over 20 years) with Buck Bros., or who represent goods as our make not stamped with the BUCK'S HEAD or BUCK BROTHERS in full.

ESTABLISHED, 1825.

R. HEINISCH'S SONS CO., NEWARK, N. J.

INCORPORATED, 1892.

New York Office, No. 90 Chambers Street.



Tailors' Shears, Trimmers, Scissors,
Tinnerns' Snips, &c.

CATALOGUES AND PRICES ON APPLICATION.

We have no contract with Messrs. Hermann Boker & Co. as Agents for the sale of our goods.

HIGHEST AWARD PARIS EXPOSITION, 1889.

ESTABLISHED 1837.
INCORPORATED 1892.



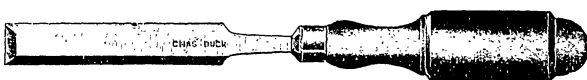
THE L. & I. J. WHITE CO.,
BUFFALO, N. Y.

MANUFACTURERS OF
Coopers', Carpenters' and Ship Tools, Plane Irons,
Cleavers, &c. Full Line Chisels.

1853

1894

Highest Awards at the World's Exposition for Superior Tools.



CHARLES BUCK,

sole surviving member of the original firm of BUCK BROS., and proprietor of the
MILLBURY EDGE TOOL WORKS, MILLBURY, MASS.,
Manufacturer of the

GENUINE STANDARD BUCK TOOLS

All kinds of Shank, Socket Firmer Chisels and Gouges, Cut and Double Irons, S. D. Bits, etc. Send for Catalogue. CAUTION.—Buyers wanting the standard buck Tools will see that they get only those stamped CHARLES BUCK when ordering from the jobbing houses. Address all correspondence to CHARLES BUCK or the

Millbury Edge Tool Works, Millbury, Mass.

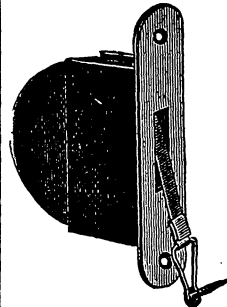
Cast Shears.

ACME SHEAR CO.,

BRIDGEPORT, - CONN.

PULLMAN Steel Frame Sash Balance.

Oldest and largest producers of a perfect working Spring Sash Balance in the world. Every Balance warranted. Require no box frames. Our prices lowest, our Balance the best. For sale by all leading Hardware dealers in the United States.



Write for Prices.

PULLMAN SASH BALANCE CO., Rochester, N. Y.

New York Office, 142 Chambers St.

Chicago Office, 235 Lake St.

IF YOU WANT THE BEST
FOR CATALOGUE & PRICES
THEIR MAKE IS EQUAL TO ANY OTHER
HAVE BEEN IN BUSINESS SINCE 1840.
BOARDMAN & SONS
NICKEL SILVER SPOONS
FORKS & C.

IF YOU WANT THE BEST
FOR CATALOGUE & PRICES
THEIR MAKE IS EQUAL TO ANY OTHER
HAVE BEEN IN BUSINESS SINCE 1840.
BOARDMAN & SONS
SILVER PLATED SPOONS
FORKS & C.

IF YOU WANT THE BEST
FOR CATALOGUE & PRICES
THEIR MAKE IS EQUAL TO ANY OTHER
HAVE BEEN IN BUSINESS SINCE 1840.
BOARDMAN & SONS
SILVER PLATED SPOONS
FORKS & C.

WE WILL BE
PLEASED TO
FURNISH FREE

Electrotypes of our goods, for Catalogues, Price Lists or any other use. Their use may help you sell our goods—we won't say anything about the advantage to us, beyond expressing our thanks. In Nail and Tack Pullers we have a full line. List of cuts on application.

SPECIALTY MFG. CO.,
HARTFORD, CONN.

THE LATEST.**THE VICTORIA.**

We have a full line of above, which is the neatest pattern ever presented to the trade, and it is stamped



NONE GENUINE WITHOUT THIS TRADE-MARK.

WM. ROGERS MFG. CO., Offices, Hartford, Conn.
 FACTORIES HARTFORD, CONN., NORWICH, CONN., AND TAUNTON, MASS.

Quality or Price?

Don't sacrifice quality for price. Don't pay too much for quality. You do neither by buying of us. The name of a reliable manufacturer on goods is worth more than it costs.



Send for folders.

Leader Tea Spoon
 FULL SIZE.

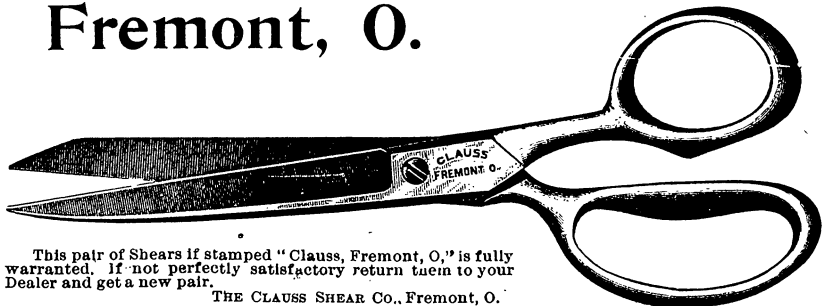
THE HOLMES & EDWARDS SILVER CO., - - Bridgeport, Conn.

WE ARE LOOKING FOR ORDERS.

NORTHAMPTON CUTLERY CO., - - Northampton, Mass.

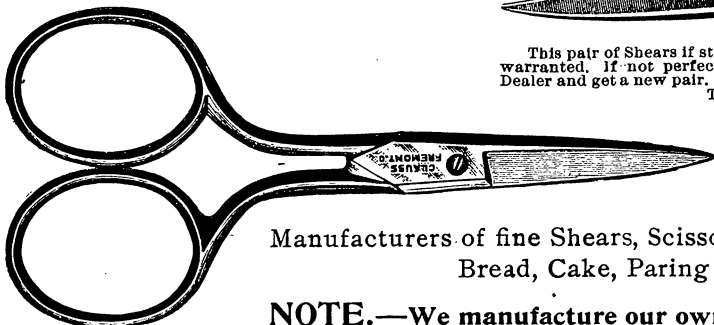
Fremont, O.

Clauss



This pair of Shears if stamped "Clauss, Fremont, O." is fully warranted. If not perfectly satisfactory return them to your Dealer and get a new pair.

THE CLAUSS SHEAR CO., Fremont, O.



THE CLAUSS SHEAR CO.,

Fremont, O., U. S. A.,

Manufacturers of fine Shears, Scissors, Tinnets' Snips and The Celebrated Clauss Bread, Cake, Paring and the Perfect Carving Knives.

NOTE.—We manufacture our own Scissors.



This is a fac-simile of the label on my **VULCAN TOOL CO.** brand of **HATCHETS**; a brand for which I have a regular trade in some sections, but to those who have not "caught on"—dealers who are handling an outside brand—I offer a limited quantity at a very low price. Inquiries for price solicited.

FAYETTE R. PLUMB, Philadelphia.

Steel
Spiders,
Griddles,
Kettles,
Maslins,
Scotch Bowls,
Stew Pots,
Stew Pans,
Etc.

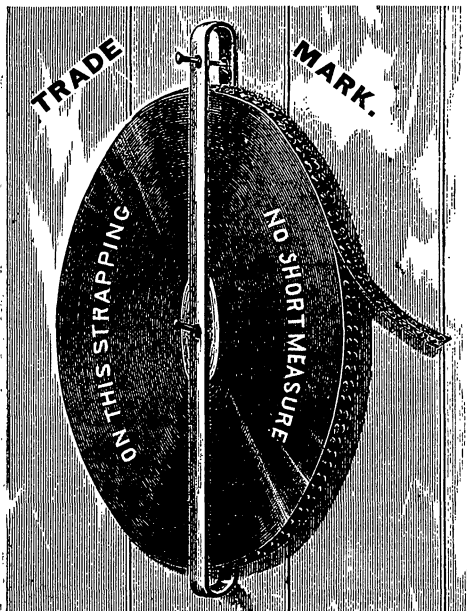
STEEL WASHERS.



The Avery Stamping Co.,
CLEVELAND, OHIO.

Injunction Order.

PATENTED IN ALL COUNTRIES.



SHOWING REEL HUNG UP READY FOR USE.
SIX PATENTS,
Dated May 14th, 1889, Nov. 25th, 1890.

See

The Iron Age,

Issue of June 21st,

Page 1210

All box straps put up in this style to be genuine must bear the name of the **CARY MFG. CO., NEW YORK**, on each reel.



The Laws of Business

FOR ALL THE

States and Territories of the Union.

By THEOPHILUS PARSONS, LL.D.

864 pages, 6 x 9 inches; full leather, \$4 50.

Contains information of the highest value to business men, treating fully and clearly of contracts, sales, agency, agreements and assessments, stoppage and transitu, considerations, limitations, notes and bills of exchange, interest and usury. Embraces chapters on commercial law in general, bonds, assignments, guaranty, the statute of frauds, receipts and releases, payment, partnership, arbitration, carriage of goods and passengers by railroad and other carriers, hotel keepers, patents, copyrights, statute of limitations, the law of place, shipping, marine, fire and life insurance, deeds of land, mortgages of land, mortgages of personal property, leases, liens of mechanics and material men, the recovery of debts, wills, executors and administrators, guardians, and the legal rights of farmers, &c. Also abstracts of the laws of all the States and Territories relating to the collection of debts, usury, the execution and acknowledgment of deeds, witness required to wills, holidays and days of grace, mechanics' liens, chattel mortgages, and nearly 300 approved forms which have been tested in courts.

Sent, post-paid, on receipt of price by

DAVID WILLIAMS,

Bookseller and Publisher,

96 - 102 READE ST., N. Y.

Are you in need of a good strapping?



If you are, give us a trial on our self drawing wire, that is put up in bundles of 100 pair each, in lengths of from four to twelve feet, or on reels of 5000 feet and you will find it the most satisfactory **Box Strap** on the market.

**The DeHaven
Mfg. Co.,**

50-54 Columbia Heights,
BROOKLYN, N. Y.



Pat. Dec. 13, 1897.

IMPROVED EDITION OF THE IRON AGE HARDWARE PRICE BOOKS.

Arranged by R. R. WILLIAMS, Hardware Editor of the Iron Age.

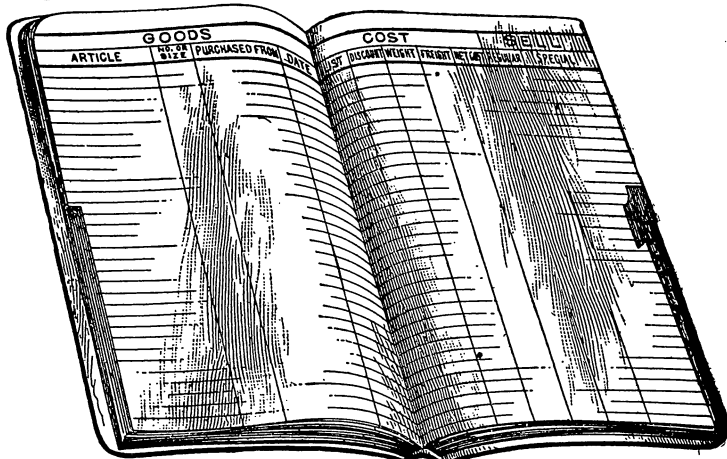
These Books are printed on paper of superior quality and bound in grain seal leather.

Columns are provided for the name and number or size, for noting from whom purchased, date of quotation or purchase, list and discount, and for entering freight expenses as an element of cost. Under the heading of selling prices, the regular and any special price, or remarks in regard to the goods are given place. This book goes into considerable detail in describing the goods and cost prices. It has been arranged in accordance with the views of many Hardwaremen whose methods are careful and exact.

Size, 4 x 7 in.; grain seal leather.

FOUR EDITIONS:

A, 200 pages, - - - - -	\$1.00
A F, 200 pages with flap, - - - - -	1.25
A 2, 400 pages, - - - - -	1.50
A F 2, 400 pages with flap, - - - - -	1.75



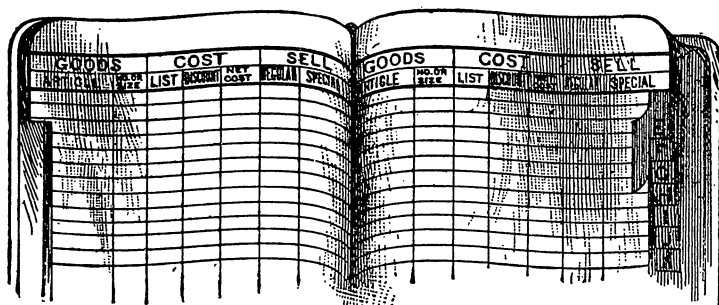
Hardware Price Book A.

In this book each page is complete, and the record of prices does not, as in Book A, run across two pages. Thus it accommodates a larger range of goods with much less detail in the record. It is adapted for office or store use, and by the use of familiar abbreviations, sufficiently large for the convenient and concise record of prices.

Size, 4 x 7 in.; grain seal leather.

FOUR EDITIONS:

B, 200 pages - - - - -	\$1.00
B F, 200 pages with flap, - - - - -	1.25
B 2, 400 pages, - - - - -	1.50
B F 2, 400 pages with flap, - - - - -	1.75



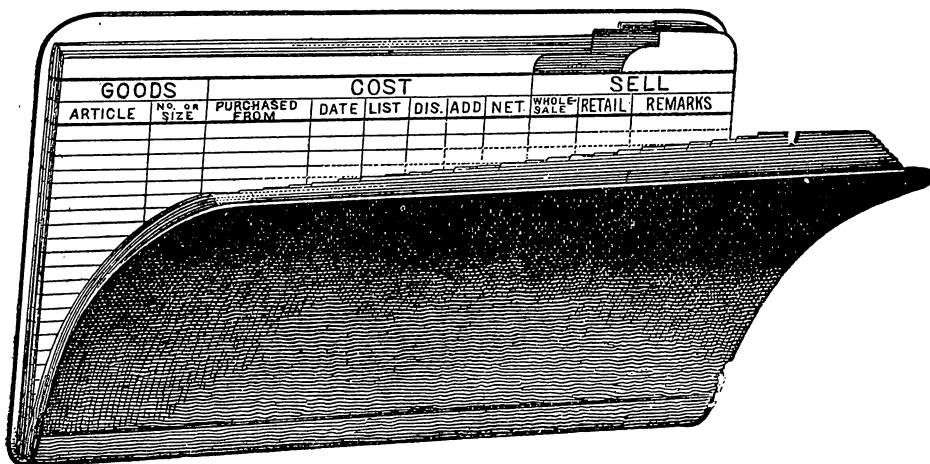
Hardware Price Book B.

The headings in Book C run across the top, in a line parallel with the hinge. In this way a very complete record can be kept on a single page. The details of weight and freight contained in Book A are omitted, and a single column headed "Add" given for the insertion of freight or other expenses which it is desirable to include in the cost. Under the selling prices space is left for the wholesale price, the retail price, and also for any remarks in regard to cost of the goods, desirability of pushing them, or other matters.

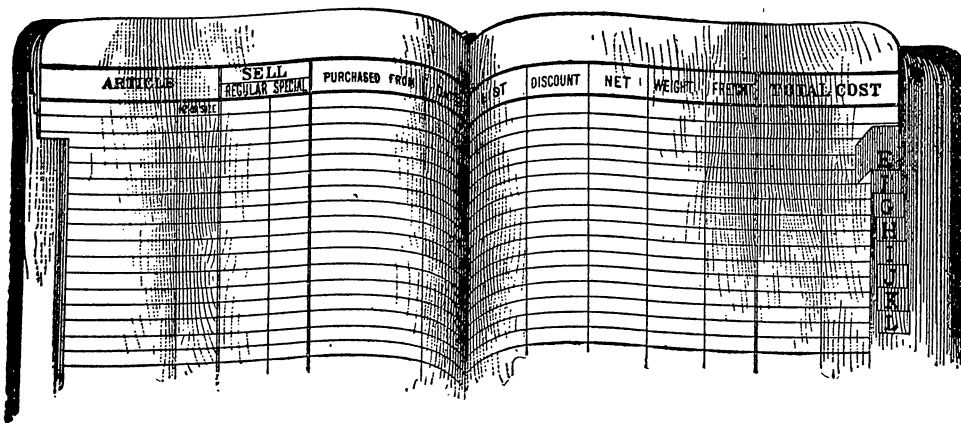
Size, 4½ x 7½ in.; grain seal leather.

FOUR EDITIONS.

C, 200 pages, - - - - -	\$1.00
C F, 200 pages with flap, - - - - -	1.25
C 2, 400 pages, - - - - -	1.50
C F 2, 400 pages with flap, - - - - -	1.75



Hardware Price Book C.



Hardware Price Book D.

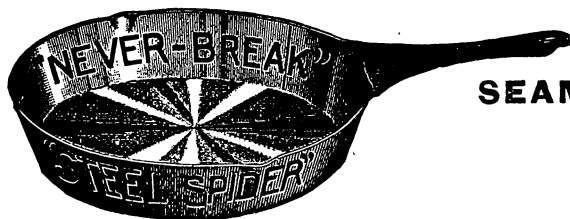
Arrangement is adapted to the requirements of the trade in this direction. Size 5¼ x 8 in.; grain seal leather.

FOUR EDITIONS.	D, 200 pages, - - - - -	\$2.00	D 2, 400 pages, - - - - -	\$3.00
	D F, 200 pages, with flap, - - - - -	2.50	D F 2, 400 pages, with flap, - - - - -	3.50

Price Book D will recommend itself particularly for desk and store use, and for salesmen on the road.

The name of the article, its number or size and the selling price are the first to meet the eye on the left-hand page, as embodying information desired when the selling price is required. The other headings follow in convenient order, by which a detailed memorandum regarding the goods may be kept, the whole being seen at a glance. A number of pages at the back of the book are arranged for memoranda, which will be found a great convenience. This arrangement

Sent post-paid, on receipt of price by **DAVID WILLIAMS, Publisher, 96-102 Reade St., New York**



Write for Catalogue and Discounts.

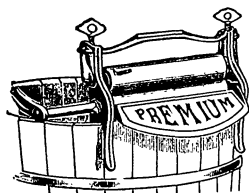
"NEVER-BREAK"

SEAMLESS STEEL COOKING UTENSILS.

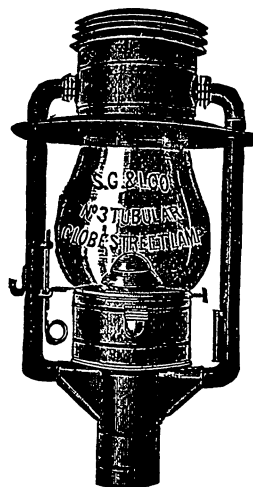
SPIDERS,
GRIDDLES,
KETTLES,
STEW PANS,
MASLINS, Etc.

Polished,
Tinned and
Porcelained.

THE BRONSON SUPPLY CO., New York and Cleveland.



COLBY WRINGER CO., - Montpelier, Vt
MANUFACTURERS OF THE
Premium Wringer,
With Automatic Apron Adjustment.
SURPLESS, DUNN & ALDER, Direct Representatives,
15 Murray Street, New York.



No. 3

Globe Street Lamp.

Light your Streets and Driveways.

The S. G. & L. CO.

Tubular Globe

Street Lamp

IS THE Best Street Lamp Manufactured.
Equal to the best Gas Light.
Will not Blow Out in the Strongest Wind.
Will not Smoke.
Will not Freeze.
Automatic Extinguisher.
Outside Wick Regulator.
Will Burn Four Hours for One Cent.

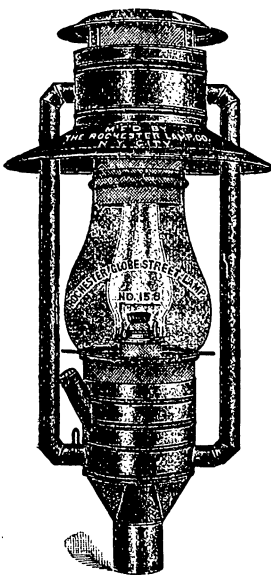
MANUFACTURED BY
STEAM GAUGE AND LANTERN CO.,
SYRACUSE, N. Y.
Western Branch, 25 Lake St., Chicago, Ill.

The Rochester Globe Tubular

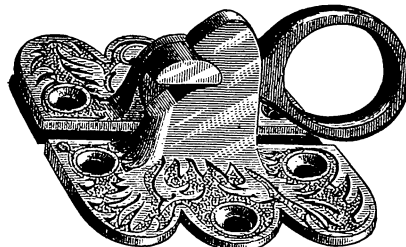
- - Station and Street Lamp.

It's a long name, but it tells a good deal. It tells you of a new Street Lamp with "The Rochester" Central Draft Burner. A central draft burner (round flame) gives three times the light of an old style flat-wick burner. The first and only Tubular Globe Central Draft Lamp ever made! Storms, rain, snow, sleet or hail do not affect it. Burns all night. Made with either bail or post socket, with 26 inch enamel reflector if wanted, for railroad and other uses. Takes regular No. 3 or 9 street lamp globe, to be had everywhere. For Railroad Stations, Ware-rooms, Mills, Docks, &c., it is the best lamp ever made. Price, \$6.00; send for trade discount.

MANUFACTURED ONLY BY
THE ROCHESTER LAMP CO.,
42 PARK PLACE, }
37 BARCLAY ST., } NEW YORK.



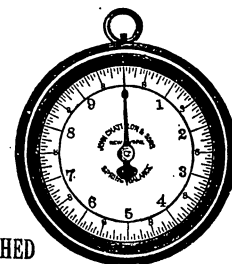
"CONROY"
Refrigerator Door Fasteners
Have rapidly supplanted all others.
Refrigerator Trimmings.



P. J. CONROY & CO., Paschall, PHILADELPHIA.

John Chatillon & Sons,

85, 87, 89, 91, 93 CLIFF ST, NEW YORK.



ESTABLISHED
1835.

SEND FOR
PRICE-LIST.



Sole Agents for
Foster Bros.' Butchers' Cutlery.



John Chatillon & Sons, N. Y.

GASOLINE & OIL
TORCHES.

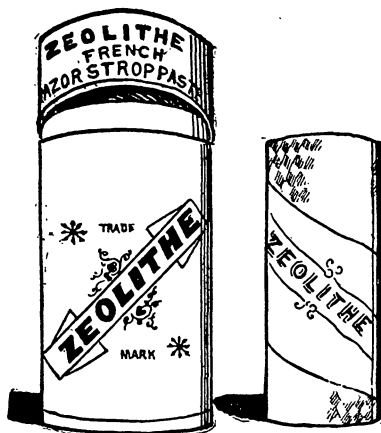
TINNERS' & PLUMBERS
FURNACES.

PAINT
BURNERS.

THE DANGLER STOVE & MFG. CO., CLEVELAND, O.

NO MORE DULL RAZORS!

ZEOLITHE



Puts the keenest edge on the dulllest razor. It has been thoroughly tested and its

Merits are Absolutely Guaranteed.

It is put up in an attractive manner and sells on sight. Send for samples and prices to the Sole Selling Agents,

DAME, STODDARD & KENDALL,

374 Washington St., Boston, Mass.

THE SAMUEL WINSLOW SKATE MFG. CO.,

Worcester,



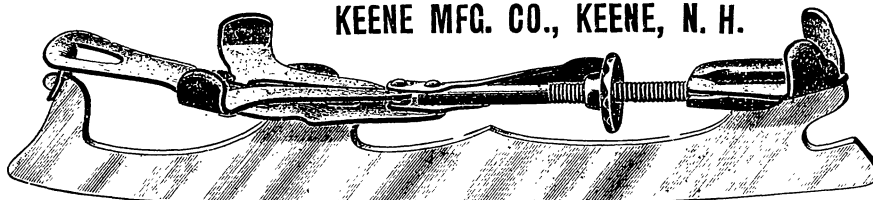
Mass., U. S. A.

The most extensive Skate Factory in the World.

LONG REACH ICE SKATES.

MANUFACTURED BY

KEENE MFG. CO., KEENE, N. H.



BIGELOW & DOWSE CO., General Agents,
229 FRANKLIN STREET, - - BOSTON, MASS.

SEND FOR 1894 CATALOGUE.

Complete Line of Ice Skates,
From the Cheapest to the Finest.

—AGENTS.—

The McIntosh-Huntington Co., Cleveland, Ohio.

Jay A. Rickard, Schenectady, N. Y.

Smith, Lyon & Field, New York, N. Y.

Standart Bros., Detroit, Mich.

Supplee Hardware Co., Philadelphia, Pa.

The Henry Sears Co., Chicago, Ill.

Weed & Co., Buffalo, N. Y.

Farwell, Ozmun, Kirk & Co., St. Paul, Minn.

BRIDGEPORT CYCLOMETER. \$3.50.

Registers 1000 miles accurately and repeats, or can be set back to zero at any time. Perfectly Noiseless, Dust Proof and Water Proof. Nothing to get out of order and can be adjusted to any wheel. A high grade cyclometer within the reach of every bicyclist.

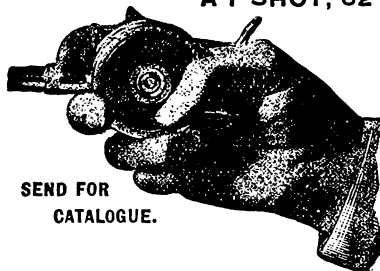
PRICE \$3.50
Made in two sizes, viz.: for 28-inch and 30-inch wheels. Send for catalog of sundries. Sold by all bicycle dealers. Cyclometers will be ready for delivery April 1.



The Bridgeport Gun Implement Co.,
313 and 315 Broadway, New York.

THE NEW "PROTECTOR" REVOLVER

A 7-SHOT, 32 CALIBRE, STANDARD CARTRIDGES.



SEND FOR
CATALOGUE.

**QUICK! DURABLE!
COMPACT! EFFECTIVE!**

The most Genteel and Serviceable Rapid Firing Revolver ever manufactured. Carried in the vest pocket as easily as a watch. **Absolutely Safe! Automatic Safety Lock!** An Ideal Weapon for a man to carry. Selling by the Thousand. Elegantly Finished, Neatly Packed in a Box, Price \$6.00. Ask your Dealer for them or send to us.

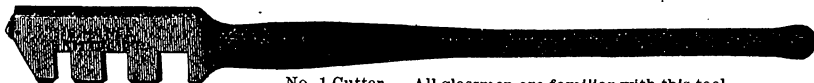
CHICAGO FIRE ARMS CO., 637-638 Monadnock Building, CHICAGO, ILL.

Yacht AND Boat Hardware.

L. W. FERDINAND & CO.,
BOSTON, MASS.

Send for 226-Page Catalogue.

MONCE'S NOVELTY GLASS CUTTERS. — INTERCHANGEABLE LOCK STENCILS



No. 1 Cutter. All glassmen are familiar with this tool.

S. G. MONCE, BRISTOL, CONN.

THE BEST JUVENILE BICYCLES

At a Lower Price than Poor Machines can be Bought.

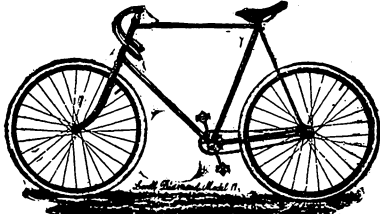
FALCON JUNIOR for boys. 24 in., weldless tube, all steel, 1½ in. Whippet pneumatic tire.

FALCON JUNIOR COMBINATION for boys and girls. 24 in., weldless tube, all steel, 1½ in. Morgan & Wright pneumatic tire.

We have closed out all our other styles and these are going. There is nothing like them at any price and no other price as low.

THE W. BINGHAM COMPANY,
CLEVELAND, OHIO.

LOVELL DIAMOND CYCLES.



RACER-WEIGHT 19 LBS.

HIGHEST GRADE.

All Sizes and Prices. See our line before you purchase.

All the Latest Improvements.

FULLY GUARANTEED.

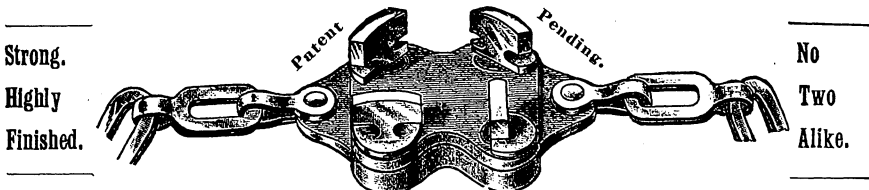
JOHN P. LOVELL ARMS CO., M'f'rs,
BOSTON, - - MASS.

SEND FOR CATALOGUE, FREE TO ALL.

AGENTS WANTED.

THE GOODHUE COMBINATION LOCK.

A KEYLESS LOCK FOR CYCLISTS, TRAVELING MEN, ETC.
EASILY OPERATED IN THE DARK.



Special Design made for "Lockers."

List, \$1.00. Good Discount to Dealers. Manufactured and sold by
THE INDEPENDENT ELECTRIC CO., - - - 39th St. and Stewart Ave., Chicago.
PARKHURST & WILKINSON, General Western Agents.

THE CRAWFORD MFG. CO.

MAKERS OF

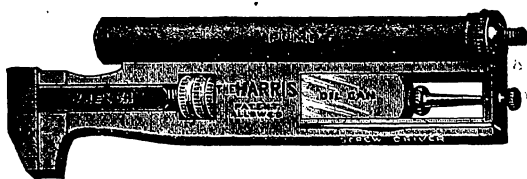
HIGH GRADE AND JUVENILE

BICYCLES,

FACTORY, HAGERSTOWN, MD.

NEW YORK OFFICE, 72 READE STREET. L. B. Whymper, Mgr.

HARRIS COMBINATION WRENCH.



Wrench, Oil Can, Screw Driver and Pump all combined in one.

Made of drop forged steel, case hardened; weight, 10 ounces or 3 ounces less than all the other tools separate.

Electrotypes on Application. Send for Descriptive Circular.

HARRIS MANUFACTURING CO., - 381 Main St., Buffalo, N. Y.

**Catalogue
of Books,**

Including the principal works on Metallurgy, Mineralogy, Engineering, Electricity, Mechanics, &c., sent free to any address by

DAVID WILLIAMS, Publisher,

98-102 Reade Street, NEW YORK



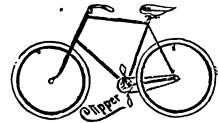
To Make a Bull's Eye

In Your Business or at the Range?

If you deal in ARMS or AMMUNITION or shoot a Rifle, Pistol or Shot Gun, you will make a HIT by sending for the IDEAL HAND BOOK.

IDEAL MFG. CO., New Haven, Ct., U. S. A.

Please mention The Iron Age when you write.



Clipper Bicycles

are built to please the dealer and rider.

Are you in the bicycle business? If not, you can make it pay to handle Clippers. Buy direct from the manufacturer and save the jobbers' profit. It will add considerable to your bank account. We want responsible dealers only. We may be able to interest you, in fact we are sure of it. Our policy is a protective one, and will please you. It protects against Scalpers and "Curb Stone Brokers."

Grand Rapids Cycle Co.

GRAND RAPIDS, MICH.

Every Year

the "STERLING" becomes more popular with dealers. They find it gives better satisfaction than any other wheel. No worry over repairs.

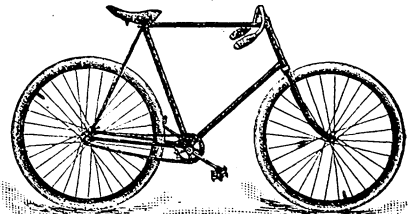
THE STERLING
(Built like a Watch.)

A wonderful, strong, light wheel, with a dozen points of superiority over all others. Our "new departure" catalogue (free) tells all about it.

STERLING CYCLE WORKS,
234 Carroll Ave., CHICAGO.

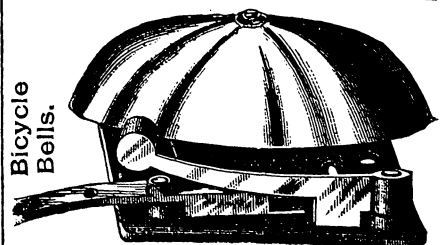
RIDE A TRIBUNE.

THAT'S THE WHEEL!



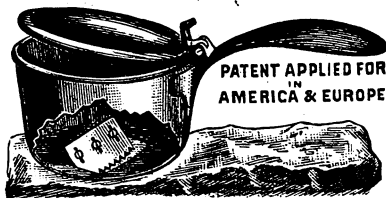
Write for Catalogue and Agency.

THE BLACK MFG. CO., - ERIE, PA.



BEVIN BROS. MFG. CO., Easthampton, Conn.,
Manufacturers of

Sleigh Bells, House, Tea Hand, Gong Bells, &c.



Ice Shredders.

For Shaving Ice

Coarse or Fine.

PRICES:

No. 33, Tinned, - - \$7.20 per doz.
No. 34, Nickeled, - - 24.00 "

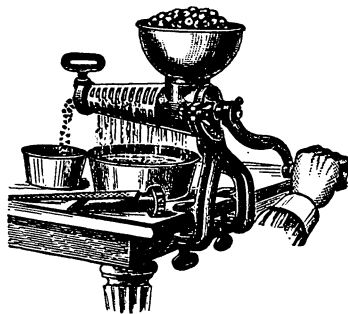
Their use will be appreciated

For Fruits, Drinks, Oysters and
Clams on the half shell,
Olives, Celery, Radishes,
Iced Tea, Sliced To-
matoes, &c., &c.
and for many purposes in the
Sick Room.

The Enterprise M'tg Co. of Pa.

Third and Dauphin Sts., Philadelphia, Pa.

Fruit, Wine and Jelly Press.



INVALUABLE FOR MAKING

Wines, Jellies and Fruit Butters.

Send for Catalogue (Free).

Cherry Stoners.

PRICES.

No. 1, Japanned, - - \$7.50 per doz.
No. 2, Tinned, - - 9.00 "

Can be adjusted by thumb screws
to adapt them to the different sizes of
Cherry Stones, and will be found
very rapid in their work and equal to
the best in the market.



Low Prices and High Quality.

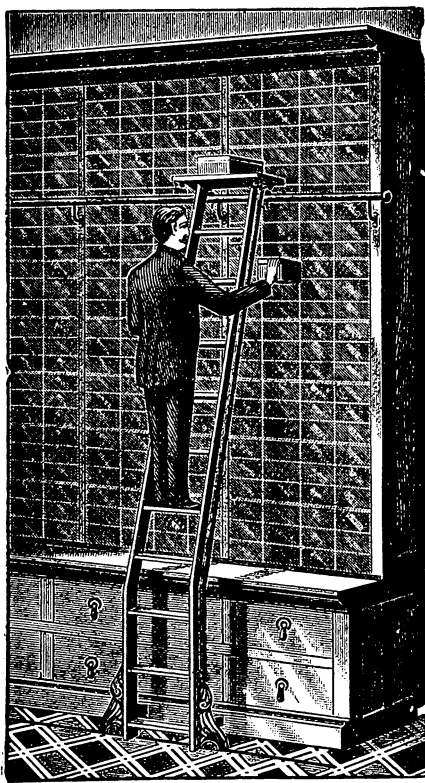
Our styles of Corn Poppers
are guaranteed to be all of
the latest and best.

Write to know what
our quantity discounts
are.



Dealers everywhere are entitled to New Catalogue and New Prices.

Bromwell Brush & Wire Goods Co., - - Cincinnati, O.
ESTABLISHED 76 YEARS.



FLOOR TRACK BICYCLE LADDER

Highest Award Columbian Exposition.

No other Ladder Service can approach the "Bicycle"
in ease and convenience of operation. Compared
with others they work like a bicycle beside a lumber
wagon.

Can be applied to any kind of shelving made.
See this space next week for other styles.
Send for Illustrated Catalogue and prices to

THE BICYCLE STEP LADDER CO.,
50 State street, Chicago, Ill.

THE CHAS. **PARKER CO.** MERIDEN
MANUFACTURERS OF
THE PARKER GUN VISES THE PARKER LAMP
WOOD SCREWS COFFEE MILLS,
CABINET-LOCKS SPOONS &c.



This illustration represents our Columbia One-Pound Mill No. 260.

The Handsomest and Best Mill of this Character in the Market.

We have over sixty other styles and sizes. Catalogues furnished dealers.

N. R. STREETER & CO.,

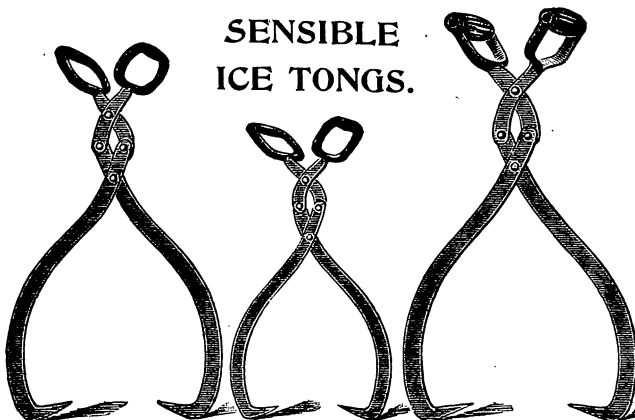
Manufacturers of SAD IRONS AND HARDWARE.

All of our Ice Tongs, for loading or hand use, are made of steel, with tempered points, causing them to be very light and stiff.

The Shape, Finish and Quality of all our goods is second to none.

Factories,
Rochester, N. Y.
Pottstown, Pa.

SENSIBLE
ICE TONGS.



REGULAR SIZES, 12 IN., 16 IN., 20 IN., 24 IN., 28 IN.
Special sizes made to order.

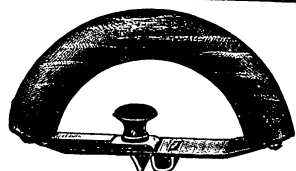
General Office, Groton, N. Y.

Our Improved Duplex
Tongs

give the widest sweep at the points, with but comparatively small action at the handles, and the duplex action gives greater force.

Write for our 1894 Catalogue of Standard Goods and Patented Specialties.

New York Office,
W. H. JACOBUS,
90 Chambers St.

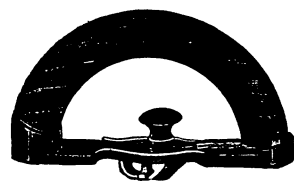


PATENT APPLIED FOR.
The Steel Stretcher Handle,
for Mrs. Potts' Sad Irons,
in Hazel Wood only.
No. 110.

The Cleveland Wood Turning Co.,
710-726 Scranton Ave., Cleveland, O.

Special work in Handles and Wood Turning of all kinds. Our line of regular made Tool Handles is the best.

New York Office:
W. H. JACOBUS,
No. 90 Chambers St.

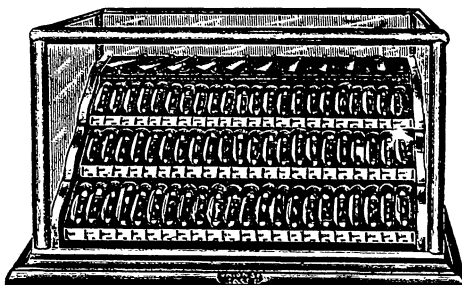


Walnut, Japanned, No. 1.
Walnut, Tinned, No. 2.
Hazel, Japanned, No. 10.
Hazel, Tinned, No. 20.

The "Dempsey" Patent Cutlery Display Case.

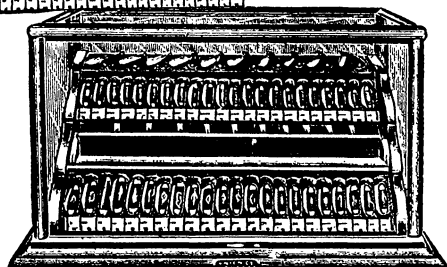
PATENTED OCTOBER 3d, 1893.

Universally indorsed by the trade. It makes the best display. Increases sales. Attracts attention to particular patterns. Saves time. Economizes space. Easier adjusted and superior in every respect to all others.



Impossible for stock to get in bad shape. Made in all lengths and any desired finish.

Marks every article without marring or soiling blades. Prevents rust. Saves money. Is the most convenient and practical manner of keeping stock ever devised. No rubber bands to lift up or soil the cutlery.



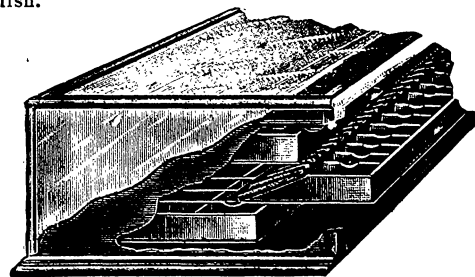
Electro shows display tray in position for selecting goods.

We solicit inquiry
from home and
foreign trade.

Write for Circulars and
Prices.

Sole

Manufacturers,



Electro shows drawers in position to supply or obtain stock.

THE UNION SHOW CASE COMPANY, CHICAGO, ILLINOIS, U. S. A.

The Following Leading Firms are our Duly Authorized Agents:

Dame, Stoddard, Kendall & Co., Boston, Mass.
F. A. Koch & Co., New York, N. Y.
Electric Cutlery Co., New York, N. Y.
A. R. Justice & Co., Philadelphia, Pa.
Henry Keidell & Co., Baltimore, Md.
The Wm. Bingham Co., Cleveland, Ohio.
Speer Hardware Co., Fort Smith, Ark.
Dixon, Bergeson & Co., Portland, Oregon.

Baker & Hamilton Hardware Co., San Francisco, Cal.
Kirkpatrick Hardware Co., Atlanta, Ga.
W. C. Belknap & Co., Louisville, Ky.
A. F. Shapleigh Hdw. Co., St. Louis, Mo.
The Wyeth Hardware & Mfg. Co., St. Joseph, Mo.
Rogers & Baldwin Hdw. Co., Springfield, Mo.
McGregor-Noe Hdw. Co., Springfield, Mo.
Wells & Nellegar Co., Chicago, Ill.

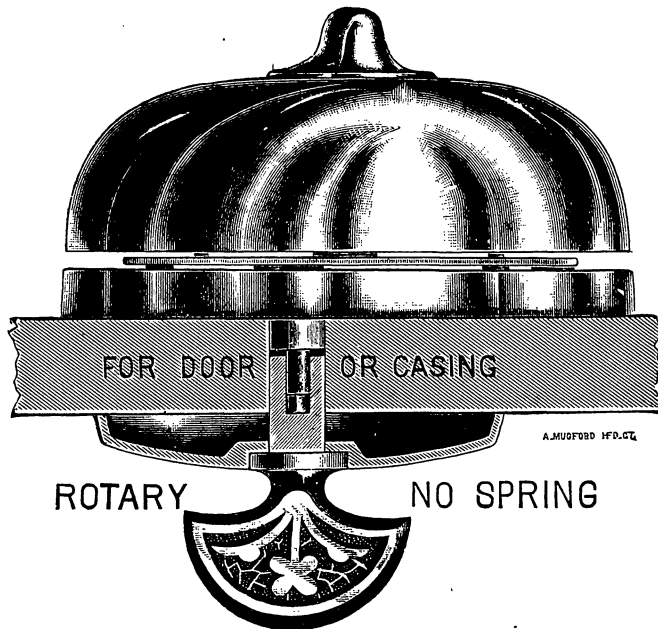
Henry Sears & Co., Chicago, Ill.
John Pritzlaff Hdw. Co., Milwaukee, Wis.
Farwell, Ozmun, Kirk & Co., St. Paul, Minn.
Fletcher Hardware Co., Detroit, Mich.
Van Camp Hardware & Iron Co., Indianapolis, Ind.
The Way Hardware Co., Hartford, Conn.
Alfred Ely & Co., Baltimore, Md.
E. F. W. Meier, St. Louis, Mo.

NEW DEPARTURE "ROTARY" DOOR BELLS

ELECTRICAL RESULTS.

3 Inch.

No. 91, Nickel Plated.
No. 92, Bronze Plated.
[Per Doz., \$17.50.



3 1/2 Inch.

No. 101, Nickel Plated.
No. 102, Bronze Plated.
Per Doz., \$20.00.

Simply turning the knob about **one-fourth in either direction** produces about **ten clear, full tones**, which though not startling or annoying, can be better heard all through the house than any bell ever made to imitate Electrical Results.

SOLE AGENTS,

JOHN H. GRAHAM & CO , { 113 Chambers St.,
N. Y. CITY, N. Y.
WRITE FOR PRICES.



ELEMENTS OF COST.

By Frederick W. Child.

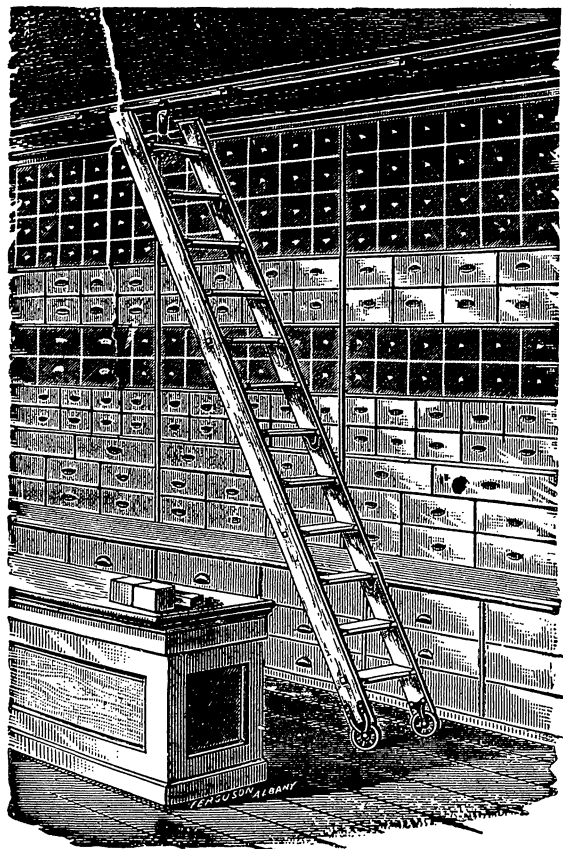
20 PAGES, 5 x 7 1/4 Inches
Paper, 25 cents.

An address to the Institute of Accounts, New York, of which the writer is a member, put in form to assist those in charge of manufacturing accounts. Practical forms are included for a series of order books, examples of foreman's order, form of pay-roll, quarter-time book, job time book, form of summary, charges book, summary of costs, material, labor, cash, expense, manufacturing and improvement acts, store-room, iron foundry, brass foundry.

SENT PREPAID ON RECEIPT OF PRICE BY
DAVID WILLIAMS, Publisher & Bookseller

96-102 Reade St., New York.

THE "NOISELESS" STORE LADDER.



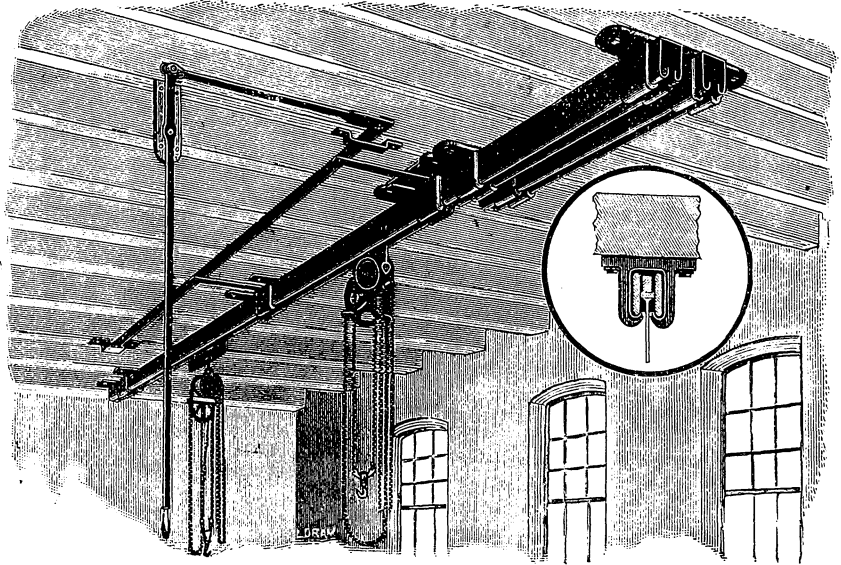
The latest and best. Perfectly noiseless. Neat in appearance.

Manufactured by
M. CROISSANT,
ALBANY, N. Y.

Patent Carrying Track System or OVERHEAD TRAMWAY.

For use in Mills, Foundries, Machine Shops, Paper and
Pulp Mills, Car Shops, Etc.

A safe, practical and labor-saving over-head system for moving all kinds of merchandise to any part of a mill or factory. No possible chance for wheels to get out or off the track. With the single and double switches and curves the loads can be easily propelled in any direction desired, and having a central hanging, an even motion is obtained.



Get our Catalogue of

**PARLOR
BARN
FIRE** Door Hangers

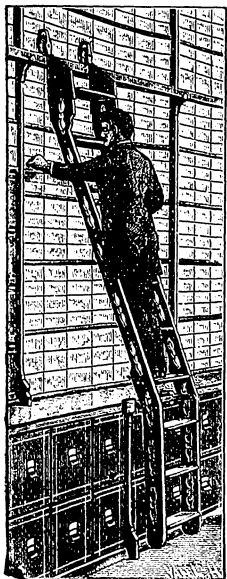
AND

A LINE OF Store Ladders.

COBURN TROLLEY TRACK MFG. CO., - - HOLYOKE, MASS.

An Investment

- ✱ That soon pays for itself, and a fixture you will wonder
- ✱ how you have got along without. Hundreds of recommendations to this effect. This is without doubt the best device of the kind on the market to-day. Steel rail planed to get the smoothest surface. Brackets made to fasten to standards, pilasters, or shelving direct. Can be adjusted to shelving with wide or narrow ledge, and can also be fitted where there is no ledge and can be used on circular rail as well.



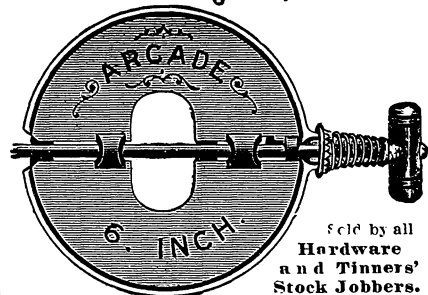
WORLD'S FAIR AWARD.

A postal card will get our Catalogue.

Morley Brothers,

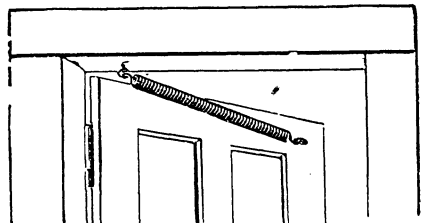
123 N. Washington Ave., Saginaw, Mich.

Made by Arcade Mfg. Co., Freeport, Ill.



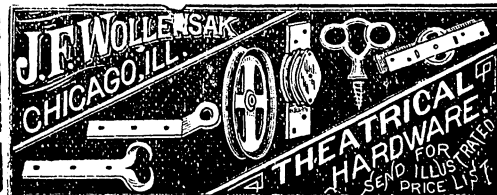
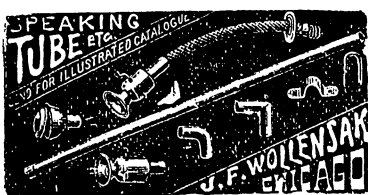
Sold by all
Hardware
and Tinner's
Stock Jobbers.

THE PERFECT DOOR SPRING.



Cheap, Simple, Durable, Effective.
Best Screen Door Spring made. Send for our list of references, comprising some of the first houses in the land. They sell readily, and that is what you are looking for. Drop us a postal.

COILED WIRE BELTING CO.,
40 & 42 Noble St., Jersey City.



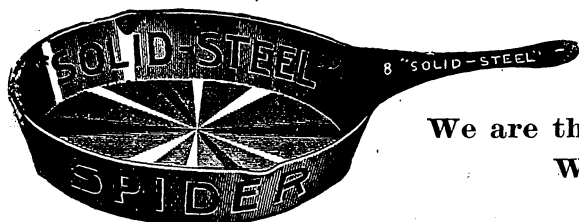
2

**Bronze Metal
Numbers.**

SEND FOR LIST.

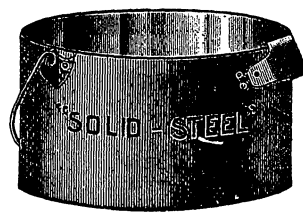
RANSOM HOWE CO.,
BURLINGTON, VT.

"SOLID-STEEL" SEAMLESS HOLLOW WARE.



No Seams, no Rivets in "Solid-Steel" Ware.

We are the leaders in Steel Hollow
Ware and all Sheet
Metal Work.

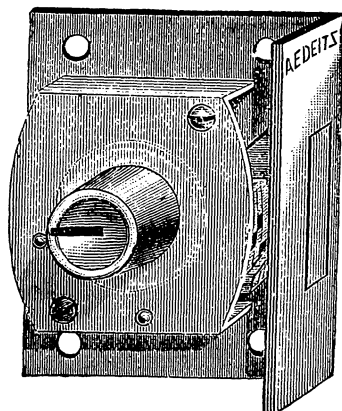


"Solid-Steel" Maslin Kettle.

The Cleveland Stamping & Tool Co., Cleveland, O.

We do Light and Heavy Stamping and Blanking. Also build Dies and Stamping Machinery.

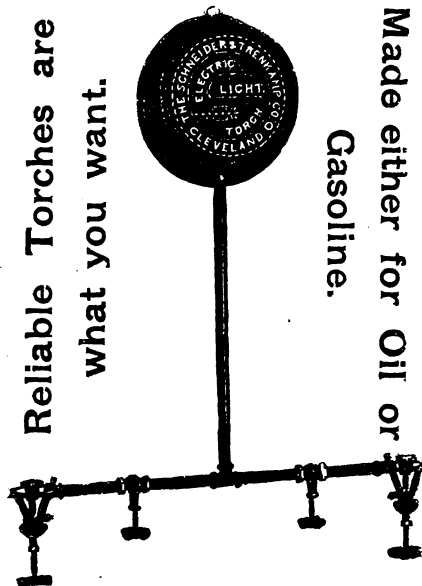
A. E. DEITZ



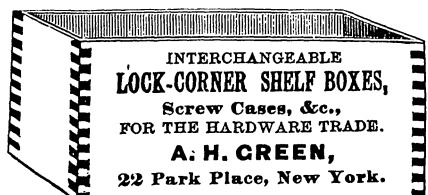
No. 51 Lock.

J. C. McCARTY & CO., Agents,
97 Chambers and 81 Reade Sts., New York

Factory, **BROOKLYN, E. D., N. Y**



These Torches are particularly adapted for use in Factories, Foundries, Machine Shops, Rolling Mills, Blacksmith Shops, Warehouses, &c. They make a strong white light, are free from smoke and are not affected by wind or rain. They are convenient and portable. These Torches can be run at an expense of about one-half cent to one cent per hour, burning a bright, steady light which is ten times greater than the light of an ordinary gas burner.
Write us for prices. A liberal discount given to the trade.
Manufactured by
THE SCHNEIDER & TRENKAMP CO.,
Nos. 479 to 497 Case Ave., Cleveland, Ohio.



INTERCHANGEABLE
LOCK-CORNER SHELF BOXES,
Screw Cases, &c.,
FOR THE HARDWARE TRADE.
A. H. GREEN,
22 Park Place, New York.

Don't make Mistakes.

It will pay you to use this book.

LADD'S DISCOUNT BOOK
A BOOK FOR EVERY DAY
MORE THAN
ONE HUNDRED THOUSAND COMPUTATIONS.
COMPILED AND EDITED BY
WILLIAM J. LADD.
PRICE, THREE DOLLARS, NET CASH.
DOUBLE INDEXED EDITION, FOUR DOLLARS NET CASH.
FOR SALE BY
David Williams,
New York.

TO
SAVE time,
Avoid error,
Verify computations,
Escape annoyance,
And to be correct, honest and happy, **USE**
LADD'S DISCOUNT BOOK.
It costs only three dollars, or four dollars for the Double Indexed Edition, and will be sent, postpaid, to any address, upon receipt of price.
DAVID WILLIAMS,
96-102 Reade St., New York.



ALUMINUM

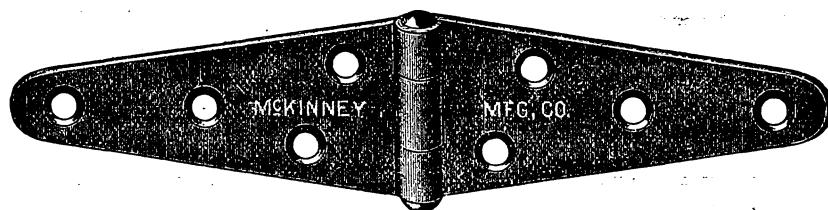
Ingots, Sheets, Rods, Tubes, Wire and Castings, Cooking Utensils and Table Ware, Tea and Coffee Pots, Chafing Dishes, Rice Boilers, Tea Kettles, &c.
WRITE FOR THE WOHLER ALUMINUM COMPANY, CATALOGUE. 55 Jackson Street, - Chicago, Ill.

STEEL HINGES AND BUTTS.

STANDARD GOODS.

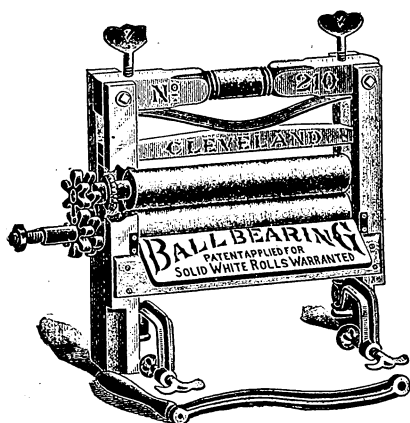
McKINNEY MFG. CO., - ALLEGHENY, PENN.

SEND FOR
LIST.



ORDERS FILLED
ON SIGHT.

"NONE BETTER."



A GOOD PROFIT TO DEALERS

A BALL BEARING WRINGER.
THE CLEVELAND

Runs like a bicycle Very easy to operate, no other like it. Can be sold at higher prices and better profit than others, hence it pays to push it. It has been on the market over a year and is giving perfect satisfaction.

Send for Sample or Write for Catalogue and Prices.

ALL OTHER KINDS OF WRINGERS.

THE PEERLESS MANUFACTURING CO.,
CLEVELAND, OHIO.

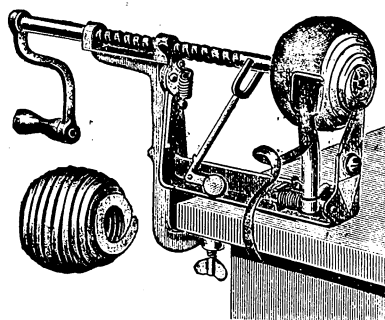
We also make High Grade Bicycles.

OSGOOD & HOWELL, Pacific Coast Agents,

132 Market St., San Francisco, Cal.

IF YOU WANT APPLE PARERS,

WE HAVE ALL KINDS, FROM SEVENTY-FIVE CENTS TO TWENTY DOLLARS EACH.



Our machines received highest award at the World's Fair. We are the oldest and largest manufacturers of Apple Parers in the world, and we make a larger variety than all others combined. If you are in need of Apple Parers write us. Our machines are sold by the jobbing trade everywhere.

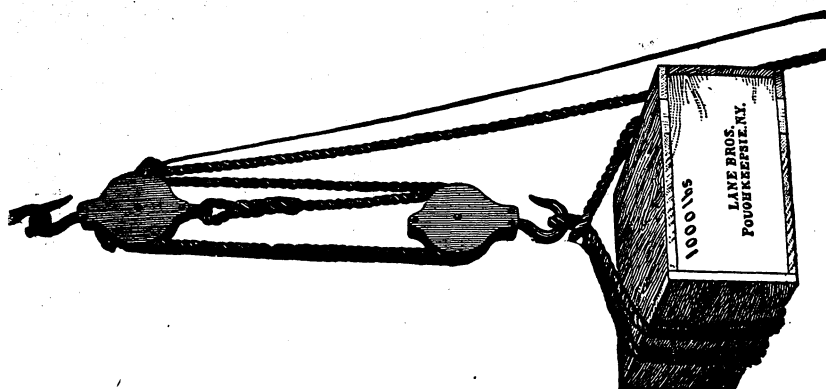
GOODELL COMPANY, ANTRIM, N. H.

A practical means of rapidly reaching absolutely accurate results without the mental wear of computing.

It gives at a glance the net of any sum at a great range of discounts, simple and complex, and it is accurate, rapid and practical. Price, \$3.00; Double Indexed Edition, \$4.00.

Mailed, postpaid, upon receipt of price by DAVID WILLIAMS, 96-102 Reade Street, New York.

LADD'S DISCOUNT BOOK.



LANE'S SELF-LOCKING TACKLEBLOCKS

Anti-Friction Steel Bushings,

Holds the load at any point, and always sure.

SEND FOR CIRCULAR.

For sale by the Hardware trade.

—MANUFACTURED BY—

LANE BROS.
POUGHKEEPSIE, N. Y.

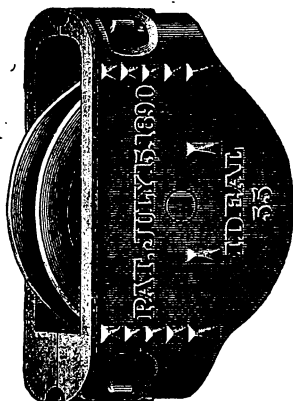
Idlewild Hammocks Will Pay You 50% Profit.

**TWELVE
HAMMOCKS
ASSORTED,** } net to
the dealer
\$16.20.

We are putting out sample bales of
IDLEWILD HAMMOCKS,
containing 12 numbers, all medium and low
priced goods.

JAMES W. EUSTIS COMPANY,
Idlewild Hammock Mills,
19 PEARL ST., BOSTON, MASS.

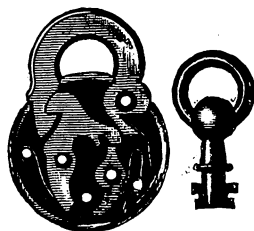
Ideal Sash Pulley, No. 55.



Adapted for auger socket or machine made mortise.
Applied without chisel or screws, quickly and a per-
fect fit in every case. The only all round Sash Pulley
made. Sample free. Price on application.

STOVER MFG. CO.,
145 River St., Freeport, Ill.

PATENT PERFECTION PADLOCK.



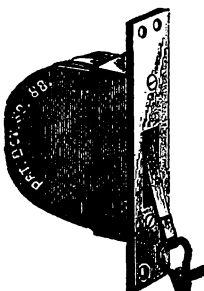
Eight Tumblers, Key Turning Both Ways.

Sizes, $\frac{1}{2}$ inch to $2\frac{1}{4}$ inches, of cast bronze. Defies competition
for quality and price. No steel or iron used, cannot rust, and can-
not be picked. Also, $\frac{1}{2}$ and $\frac{3}{4}$ inch Padlocks, opened with a com-
mon pin, in brass and nickel, for cats and small dogs. The best
Railroad Switch and Car Lock in the world.

Adopted by the United States Treasury for bonded warehouses.

AMES SWORD CO., Chicopee, Mass.

Send for Price-Lists and Circulars.



DOES IT PAY?

To buy an inferior article, which your
trade condemns, when you can get

THE CALDWELL SASH BALANCE.

The best material, right principle and
care in making and testing have made
it the LEADER for five years. Write to

CALDWELL MFG. CO., Rochester, N. Y.

SASH WEIGHTS

E. E. BROWN & CO.,

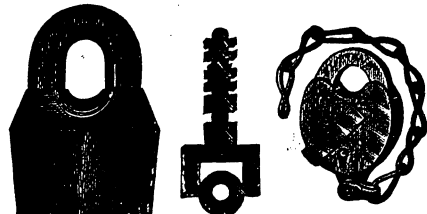
McKean and Meadow Sts.,

PHILADELPHIA, PA.

ESTABLISHED 1879.

KEYSTONE LOCK WORKS.

E. T. FRAIM, Lancaster, Pa., U. S. A.

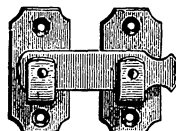


Originators, designers, patentees and manufacturers
of all the leading popular styles of **PADLOCKS,**
Key-Locking Scandinavian with our patent Inter-
Locking Tumblers; the only reliable lock of this style
ever made. **SELF-LOCKING** Scandinavian of
the highest type of perfection. Dust Proof Railroad,
Freight Car and Switch Padlocks. Brass, Bronze,
Steel and Malleable Iron Padlocks for all purposes and
in all finishes. 131 different kinds. Write for our new
100-page catalogue.

SUPPLESS, DUNN & ALDER, General Agents,
97 Chambers St., NEW YORK.

No. 450

BRONZED WROUGHT STEEL SHUTTER BARS.



STRONG AND ELEGANT.

Size, $1\frac{3}{4}$ inch. 2 inch.
Per dozen, \$0.50. \$0.55

THE STANLEY WORKS, NEW BRITAIN, CONN.
79 CHAMBERS ST., N. Y.

STAR LOCK WORKS, PHILA.

W. & L. WOLF,

MANUF'RS OF

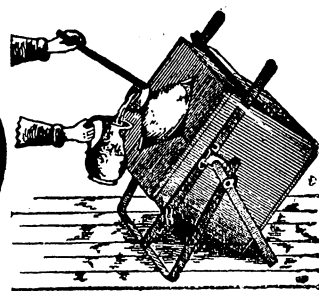
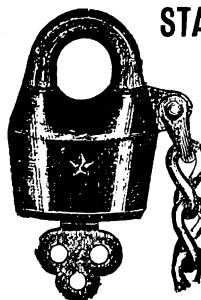
1st QUALITY ONLY
SCANDINAVIAN

AND

Spring Padlocks,
Trunk & Case Locks,

Carboy Stands, &c.

Catalogues Sent on Application.



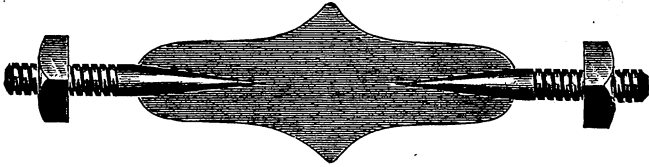
RICHARD ECCLES,**AUBURN, N. Y.,**

—MANUFACTURER OF—

CARRIAGE FORGINGS,

Couplings, Clips, King Bolts, Fifth Wheels, &c.

SEND FOR SUPPLEMENT TO CATALOGUE,



Showing a full line of Axle Clips, Spring Bar Clips and Three Piece Saddle Clips.

SEND FOR CATALOGUE AND SUPPLEMENT.

SASH WEIGHTS!**NORTON BROTHERS,**

Manufacturers,

Office: 813 Masonic Temple, CHICAGO.

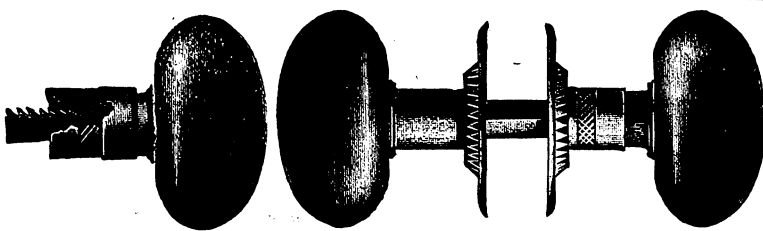
WORKS AT MAYWOOD, ILL.

**"DUPLEX"
Wrought
BUTTS.**Made of Cold Rolled Steel and Wrought
Bronze with hardened Steel Bushings.
All sizes and finishes.**WAREHOUSES:**New York,
96 & 98 Reade St.Philadelphia,
514 Commerce St.Chicago,
73 Wabash Ave.

Factories, READING, PA.

**Reading
Hardware
Company.**

Sectional cut showing construction of knob.



Half size cut of knob as applied to door. No side screws or adjusting washers.

Don't you want your stock to represent the latest and most improved up to date Hardware? The Whipple Patent Door Knob is the latest and best Door Knob attachment ever made. Give it a trial. **PERRY & WHIPPLE CO.,** New Haven, Conn.
New York Sales Agent, E. G. SHEPARD, 142 Chambers Street.**WHY USE WOODEN OR HEAVY STEEL BLOCKS**

WHEN THE STEEL AND IRON

TACKLE BLOCKS

—MADE BY—

The Cleveland Block Co.,

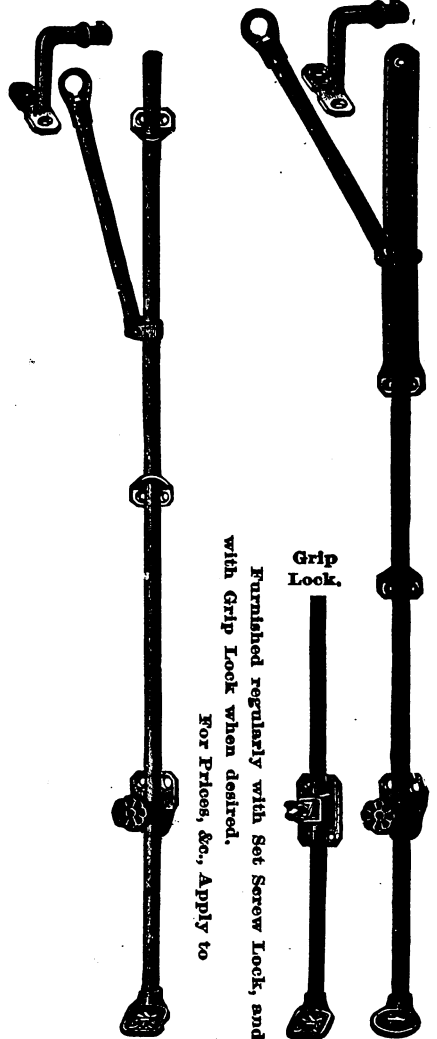
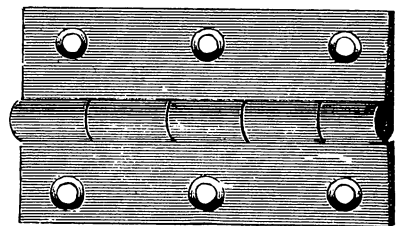
CLEVELAND, OHIO, U. S. A.,

ARE BETTER IN EVERY WAY.

No waste material. Every ounce of weight in the line of strength. No clumsy outside straps or bolts. As light as wooden blocks and vastly more durable. They wear, but never break. Sheaves interchangeable.

General Agents: Topping Brothers, 92 Chambers Street, New York.

New England Agents, - Dodge, Haley & Co., 212 High Street, Boston.

TRANSOMLIFTERS**"EAGLE."****"SHIELD."**Furnished regularly with Set Screw Lock, and with Grip Lock when desired.
For Prices, &c., Apply to**Grip
Lock.****J. F. WOLLENSAK, PATENTEE
CHICAGO, ILLINOIS.****Cast Brass Butt Hinges**

IN STOCK AND FOR SALE BY

W. & J. TIEBOUT,

Nos. 16 & 18 Chambers Street, New York.

MANUFACTURERS OF

**BRASS, GALVANIZED & SHIP CHANDLERY
HARDWARE.****Carriage Forgings**

Of every description. Also Special Forgings.

E. D. CLAPP MFG. CO., Auburn, N. Y.

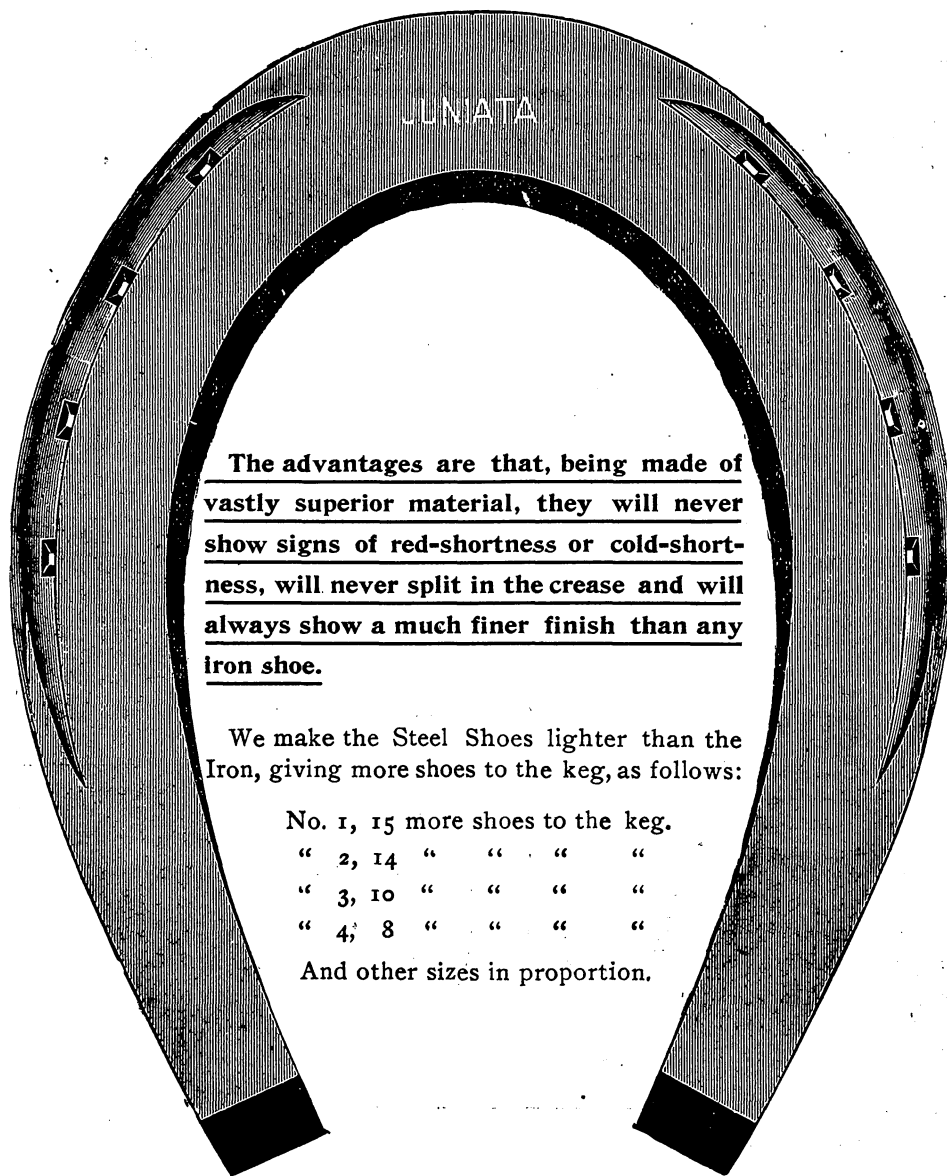
New illustrated catalogue issued May 10th mailed on application.

Hicks' Builders' Guide.—Comprising an easy, practical system of estimating material and labor for carpenters, contractors and builders. A comprehensive guide to those engaged in the various branches of the building trades. By I. P. Hicks; illustrated by numerous engravings of original drawings. 180 pages; cloth\$1.00
For Sale by David Williams, 96-102 Reade St., N. Y.

STEEL HORSE SHOES.

SHOENBERGER & CO., PITTSBURGH, PA.,

After numerous and costly experiments have succeeded in manufacturing a special quality of soft homogeneous steel, specially adapted to the manufacture of Horse and Mule Shoes, and are now making from this steel Extra Swaged and Government Pattern Horse and Mule Shoes. They give the best of satisfaction everywhere and we furnish them to the trade at the same prices as the regular iron shoe sold by ourselves and our competitors. We are at present making our Roadster Pattern Horse Shoes out of Iron, but we will make them of Steel also within a short time.



The advantages are that, being made of vastly superior material, they will never show signs of red-shortness or cold-shortness, will never split in the crease and will always show a much finer finish than any iron shoe.

We make the Steel Shoes lighter than the Iron, giving more shoes to the keg, as follows:

No. 1, 15 more shoes to the keg.

" 2, 14 " " " "

" 3, 10 " " " "

" 4, 8 " " " "

And other sizes in proportion.

No. 2 EXTRA SWAGED FRONT.

We also beg to say that we have introduced improved machinery into our new factory and have doubled our capacity, and are now prepared to furnish the best shoe, either iron or steel, ever offered to the trade.

We would also call your attention to our Improved Steel Toe Calk, equal to any in the market. To secure the best wearing qualities use sand or borax in welding on a calk and cool off at a dark red, or still better, cool off without plunging in water. We make sizes numbers 1, 2, 3, 4, 5 and 6, packed in 25-pound boxes.

Write to us for information and prices, or apply to jobbers and dealers, who sell them everywhere.

SHOENBERGER & CO.,

JUNIATA IRON AND STEEL WORKS, - - - PITTSBURGH, PA.

SCRANTON FORGING CO.,

SCRANTON, PA

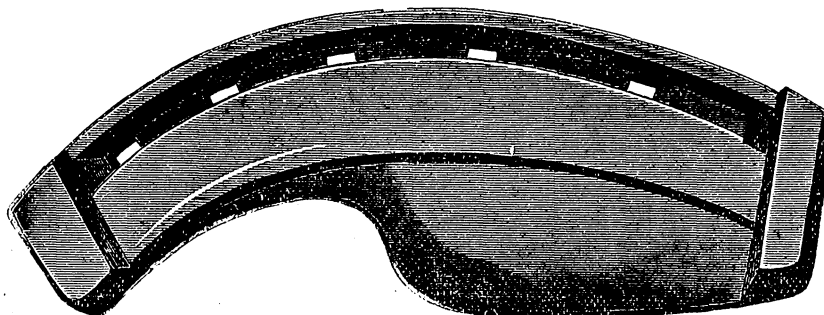
CARRIAGE HARDWARE AND

SPECIAL DROP FORGINGS.

FORGED

OX

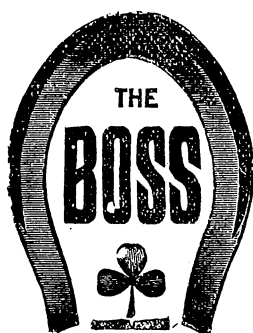
SHOES.



Made under Deebie's Patent, Aug. 9, 1887.

Our 1891 pattern is a modification of the style we have made for the past four years, giving additional strength to the web.

IT IS JUST RIGHT.



HORSE AND MULE SHOES

Superior Quality, Shape and Finish.

BRYDEN HORSE SHOE CO.,

CATASAUQUA, PA.

RHODE ISLAND PERKINS HORSE SHOE CO.,
MANUFACTURERS OF

Horse and Mule Shoes of the Perkins Pattern.

SPECIALTIES:—X L Steel Shoes, Toe Weight Shoes and Goodenough Shoes.

Works at Valley Falls, R. I.

Office, 31 Exchange Place, Providence, R. I.

F. W. CARPENTER, Pres.,

C. H. PERKINS, Gen. Manager,

R. W. COMSTOCK, Sec'y,

CHARLES R. STARK, Treas.

J. C. McCARTY & CO., Agents - 97 Chambers Street, New York.

THE NEW DIAMOND STATE HORSE AND MULE SHOES.

JUST TRY THEM and YOU will say they excel all others.

MANUFACTURED BY

DIAMOND STATE IRON CO.
WILMINGTON, DELAWARE.

Other "high grade" specialties in Rivets, Spikes, Splice Bars, Track and Machine Bolts, Blank Nuts, Stay Bolt Iron, Horse Shoe Iron, Bar Iron, &c.

PHILADELPHIA OFFICE,
208 So. Fourth St.

{ Correspondence invited }

NEW YORK OFFICE,
11 Pine St.

Elegant Iron.

Beautiful Shape.

HORSE SHOES,

Light, Medium and Heavy.

MULE SHOES,

Light, Medium and Heavy.

Illustrated booklet and prices to all parts of the world on application.

OLD DOMINION IRON AND NAIL WORKS CO.,

ARTHUR B. CLARKE, President.

Chicago Office, 45 La Salle St.

Richmond, Va., U. S. A

BURDEN'S

HORSE SHOES.

"Burden Best"

Iron

Boiler Rivets.

The Burden Iron Co.

TROY, N. Y.

PHOENIX HORSE SHOES.

PHOENIX HORSE SHOE CO.,

ROLLING MILLS AND FACTORIES,

Poughkeepsie, N. Y.

Joliet, Ill.

NEW YORK OFFICE, No. 66 Reade St.

Standard Horse Shoe Co.,

Manufacturers of

HORSE AND MULE SHOES.

LEEDS, ROBINSON & CO., General Agents,

4 Liberty Square, Boston, Mass.

“The Best Driving Nail.”

HIGHEST AWARD
—AT—
World's Columbian Exposition.

“The Best Nail to Hold.”

In the tests submitted before the judges on awards the Capewell No. 6 was shown to be 17 per cent. tougher than No. 8 of other makes.

CAPEWELL HORSE NAILS,
—MADE BY—
THE CAPEWELL HORSE NAIL CO., - - - HARTFORD, CONN.

Office of D. G. BURNHAM,
Director of Works, World's Columbian Exposition,
JACKSON PARK, CHICAGO, ILL.

October 28, 1895.

To THE CAPEWELL HORSE NAIL CO.:
Gentlemen—I have used your horse nails here on the horses belonging to the World's Columbian Exposition, and I think they are far superior to any others that I have ever used. As I have been in the horseshoeing business for about twenty-five years, I know what I am talking about.

Very respectfully,
HERMAN J. HENKE,
Foreman Blacksmith, World's Columbian Exposition.

The Capewell Patent Corrugated Horse Nail.

Needs No Clinching.

At Centennial Exposition AT PHILADELPHIA. **HIGHEST AWARD** At World's Columbian Exposition AT CHICAGO.

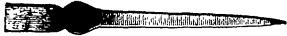
TO THE

PUTNAM

HOT-FORGED AND HAMMER-POINTED

HORSESHOE NAILS.

REGULAR HEADS for ordinary creased shoes.
CITY HEADS, or short heads for shallow creased shoes.
COUNTER HEADS for “Goodenough” shoes.
FRENCH HEADS for punched shoes, without creases.

These Nails are drawn from head to point from the BEST SWEDISH IRON RODS at a welding heat, thus:  by percussive hammer blows only; then polished by the water process, without the aid of acids, and hammer-pointed without any rolling or shearing.

They are the best because they are made of the best iron, and by the only process in which the iron is treated naturally, and its strength preserved.

Those who handle only the best goods hold the confidence of their customers.

Putnam Nail Co., Neponset, Boston, Mass.

H. D. SMITH & CO.,

Plantsville, Conn.,

MANUFACTURERS OF THE BEST QUALITY

CARRIAGE MAKERS' HARDWARE,

MANUFACTURE THE LARGEST VARIETY OF

FORGED CARRIAGE IRONS

Of Best Material and Workmanship.

Send for Price and Illustrated List of

CHAMPLAIN

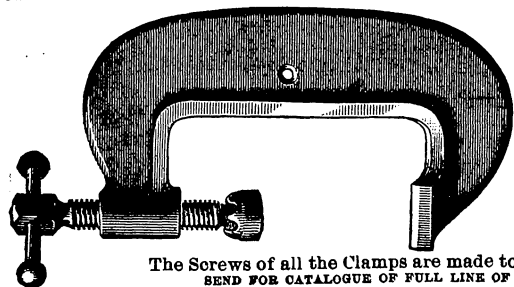
Manufactured by the NATIONAL HORSE NAIL CO.,
VERGENNES, VERMONT.

All Sizes. All Patterns. All Warranted. Sold Everywhere.

J. C. McCARTY & CO., Agents, New York.

LE COUNT'S HEAVY STEEL CLAMP.

Extra heavy, with Button on end of screw, hung on a ball so as to accommodate itself to irregularities with out bending the screw. The foot of the Clamp is planed.



No. 1, opening to 2 inch.		
2.	3	\$1 75
3.	4	2 00
4.	5	2 25
5.	6	2 50
6.	8	2 75
7.	10	3 25
8.	12	3 75
9.	14	4 25
10.	16	5 00
11.	18	6 00
Full Set, 11 sizes, \$40.50.		7 00

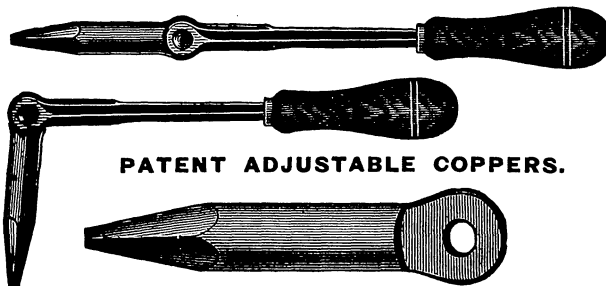
Ship or Bridge Clamp with Large Screws.
No. 12 opens 24 inches.....price, \$12 00
13 30 16 00

The Screws of all the Clamps are made to reach the lower number.
SEND FOR CATALOGUE OF FULL LINE OF MACHINISTS' TOOLS.

C. W. LE COUNT, MANUFACTURER, SO. NORWALK, CONN., U. S. A.
These goods are for sale by CHAS. CHURCHILL & CO., Ltd., 21 Cross St., London, England.

Covert Pat. Adjustable Soldering Irons and Coppers

It is a complete tool in every respect, and can be as easily adjusted at angle while hot as cold. The handle can be used indefinitely, as when the copper is worn out it can be replaced in the same handle, making the iron as good as new at about half the cost of the ordinary soldering iron.



PATENT ADJUSTABLE COPPERS.

A sample of $\frac{3}{8}$ in. soldering iron will be sent by mail, free of postage to any address, on receipt of sixty cents (60c.).

FOR SALE BY ALL GENERAL HARDWARE AND PLUMBERS' SUPPLY HOUSES.

COVERT MFG. CO., - West Troy, N. Y.

P. F. BURKE, C. F. BURKICK & CO.
Manufacturers of
PATENT STEEL
(Blunt and Sharp)
TOE-CALKS.
—ALSO—
BURKE'S IMPROVED
HORSESHOERS'
FOOT VICE.
Send for Circulars.
360 Dorchester Av. Die for Welding
BOSTON, MASS. Sharp Calks.

Crescent

Horse and Mule Shoes,
BAR IRON.

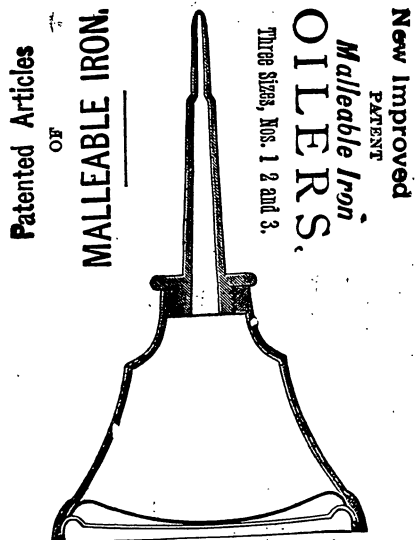
CRESCENT HORSE SHOE
IRON CO.

Max Meadows, Va.

FROST'S ANTI-RATTLE
Pat. Jan. 20, 1880.
Cut One-half Size.
Sample pair sent to any hardware or saddlery firm by addressing
The Frost Thill Spring Co.,
Boston, Mass.

THE WILCOX & HOWE COMPANY,
BIRMINGHAM, CONN.
MANUFACTURERS OF
A Full Line of Carriage Hardware
Bicycle and other Drop Forgings of every description made to order.
Estimates cheerfully given. Send for Catalogue.

BUFFALO SCALE CO., Buffalo, N. Y. SCALES OF ALL KINDS.



Patented Articles

OF

MALLEABLE IRON.

New Improved
PATENT
Malleable Iron
OILERS.
Three sizes, Nos. 1, 2 and 3.

Hammer's Adjustable Clamps.
Mall. Iron Hand Lamps.
M. I. Hanging Lamps.

New Pattern Heavy Screw Clamps.
Strongest in the market.

For Sale by all the Principal Hardware Dealers.
SEND FOR PRICE LIST.
MALLEABLE IRON CASTINGS
of superior quality, and Hardware Specialties
in Malleable Iron, made to order.

HAMMER & CO., Branford, Conn.

HARDWARE DEALERS

CAN RECOMMEND THE

CHAMPION METAL WINDOW SASH CHAINS

to their customers as a reliable substitute for
Sash Cords, very strong and lasting (some in
daily use ten years), and gives thorough satis-
faction wherever used. The patented attach-
ments are very simple and can be applied to
any window.

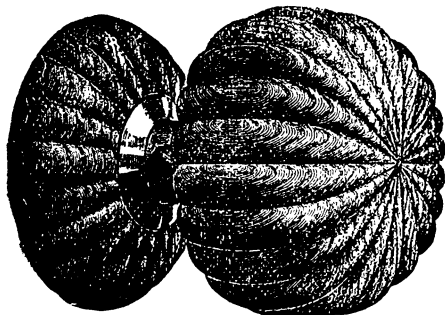
MANUFACTURED ONLY BY

"THOMAS MORTON,"

65 Elizabeth Street,

Write for Prices.

NEW YORK.

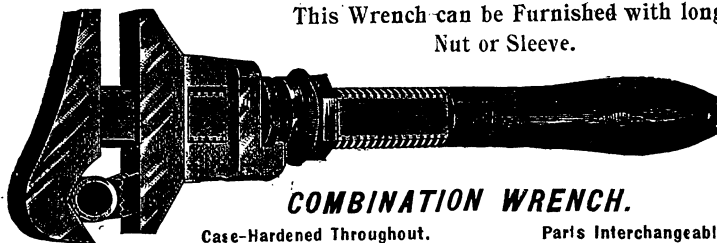


WOOD DOOR KNOBS,
DOOR SPRINGS AND CHECKS
AND CHECKING SPRING HINGES
NEW GOODS. NEW PRICES.

Send for New Price-List.

J. BARDSLEY, 149 & 151 Baxter St. New York.

Handbook of Ornament. By FRANZ SALES MEYER.
A grammar of art industrial and architectural de-
signing in all its branches, for practical as well as
theoretical use. Authorized English edition. 680
pages, illustrated, cloth..... \$3.60
For Sale by David Williams, 96-102 Reade St., New York



This Wrench can be Furnished with long
Nut or Sleeve.

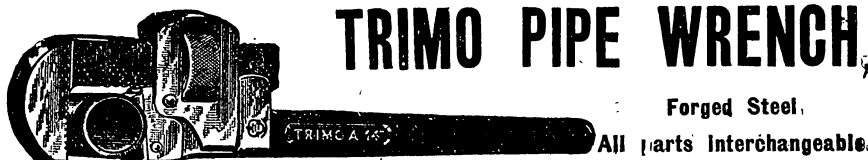
COMBINATION WRENCH.

Case-Hardened Throughout.

Parts Interchangeable

This wrench not only combines the superior qualities of a Gas Pipe Wrench but also all the
requisite combinations of a regular Nut Wrench, thus making a combination which has no equal.
For Circulars and Price-List, address

BEMIS & CALL HARDWARE & TOOL CO., Springfield, Mass., U. S. A.



TRIMO PIPE WRENCH

Forged Steel.

All parts Interchangeable.

Grips firmly without loss of motion. Releases readily. Never locks. Causes no
trouble in close quarters. Does not crush the pipe.

TRIMO

CHAIN
PIPE

WRENCH.



Superior in strength and ease of operation.
COMPLETE circular grip. Never slips nor crushes.

Can be used with one
hand and in closer quarters
than any other Basin
Wrench. Parts Interchange-
able.

TRIMO

BASIN WRENCH.

TRIMONT MFG. CO.,

ROXBURY
MASS.



J. H. WILLIAMS & CO.,

9 to 15 Richards Street, Brooklyn, N. Y.

FORGED

Steel Lathe Dogs

In Twelve Sizes.

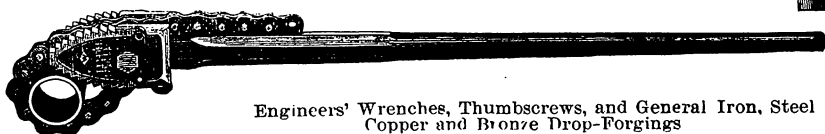
FORGED

STEEL MACHINE HANDLES

In Six Sizes.

Brock's Patent Drop-Forged Chain Pipe Wrench,

Improved Model, in Seven Sizes.



Engineers' Wrenches, Thumbscrews, and General Iron, Steel
Copper and Bronze Drop-Forgings

HYDRAULIC FORGINGS



WYMAN & GORDON, Worcester, Mass.

BILLINGS PATENT DOUBLE-ACTING RATCHET DRILL

FOR MORSE TAPER SHANK DRILLS.

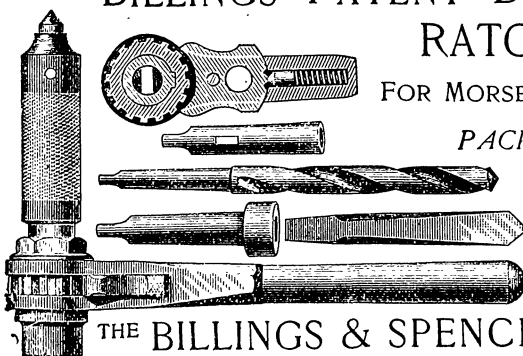
PACKER RATCHET DRILLS

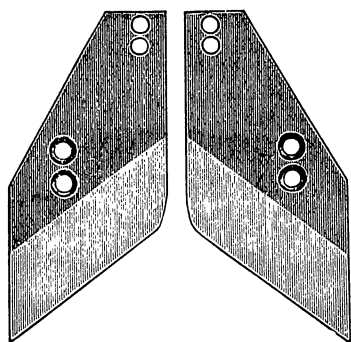
"BOILER RATCHET"

"AUGER RATCHET"

MANUFACTURED BY

THE BILLINGS & SPENCER CO., Hartford, Conn.
U. S. A.



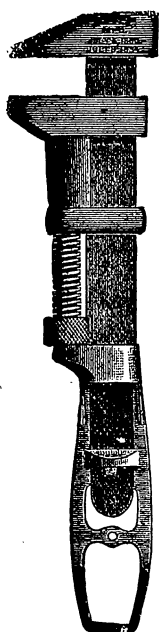
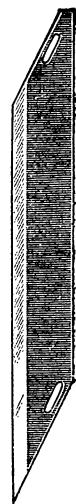
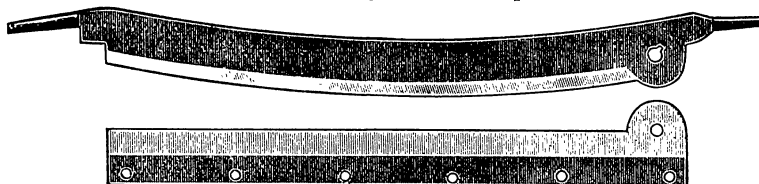
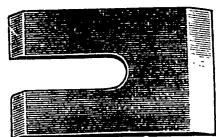


LORING COES & CO.,

WORCESTER, MASS.

Manufacturers of MACHINE KNIVES.

Shear Blades and Strips, Moulding Cutter Plate, Die Stock for Leather, Cloth and Paper Cutting Dies. Lawn Mower and Hay Cutter Knives of every description.



L. COES'

Genuine Improved
KNIFE HANDLE
PATENT

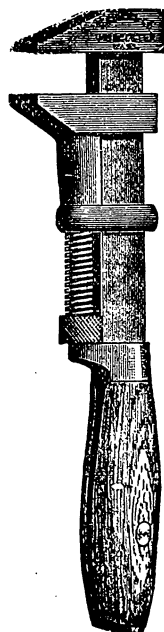
Screw Wrenches

MANUFACTURED BY

COES WRENCH CO.,
WORCESTER, MASS.

Established in
1839.
Registered
March 31, 1874.

Patented July
6, 1880.
Patented July
8, 1884.



Sectional View Illustrates our New Knife Handle, showing Malleable Iron Frame and Shank of Bar keyed into position.

1/2" Straight Bar, Extra Long Nut for Screw in Jaw.

The BEST MADE and STRONGEST WRENCH in the MARKET.

J. C. McCARTY & CO.,
JOHN H. GRAHAM & CO., } New York Agents.

The English and American Mechanic:

AN EVERY-DAY HAND-BOOK FOR THE WORKSHOP AND THE FACTORY.

CONTAINING

Several Thousand Receipts, Rules and Tables Indispensable to the Mechanic, the Artisan and the Manufacturer.

By B. Frank Van Cleve.

A new, revised, enlarged and improved edition, edited by Emory Edwards, M.E.

ILLUSTRATED WITH EIGHTY-FIVE ENGRAVINGS.

In one volume, 500 pages, 12mo, closely printed, containing a vast body of information of value to all practical men. Elegantly bound in scarlet cloth, gilt. Price \$2.00.

Any Book Published Sent, Post-paid, on Receipt of the Price, by

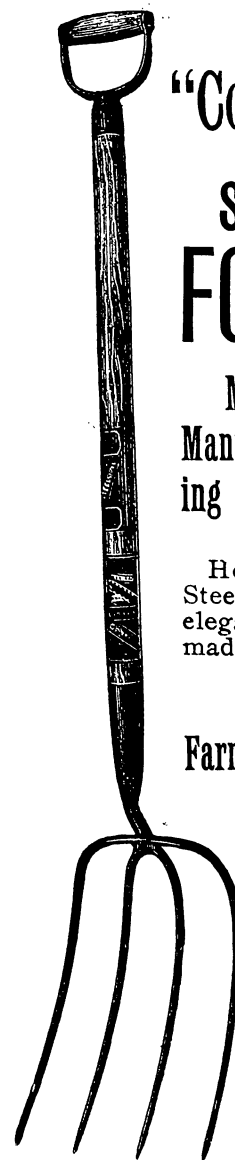
DAVID WILLIAMS, Publisher and Bookseller,

96-102 Reade Street, New York.

• IMPROVED MINE LAMP •
FOR ANTHRACITE AND
BITUMINOUS
MINING.
6
DIFFERENT
STYLES
OF SPOUTS.
SAMPLE 15¢.

SEAMLESS
BRASS
COLLAR
BRASS HINGE
Lid Solid
No Soldering

B. E. LEONARD, Scranton, Pa.



THE

"Columbia"

Trade-Mark.

SOCKET FORKS.

Made in Hay,
Manure and Spad-
ing Fork Patterns.

Heavy and long
Steel Socket. Most
elegant goods ever
made.

The Iowa
Farming Tool Co.,

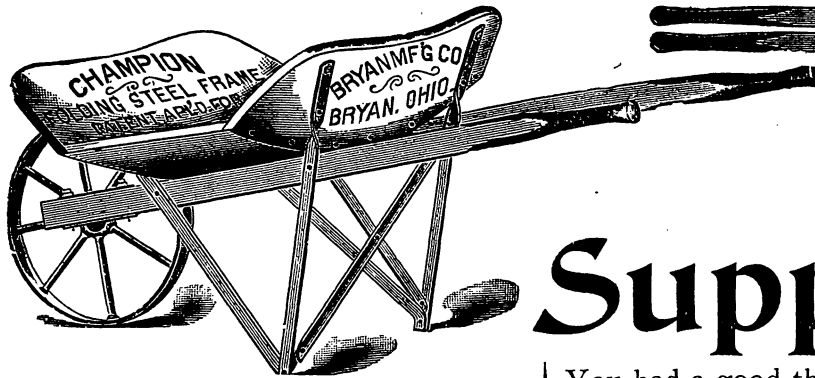
Makers of,

FORKS, HOES,
RAKES,
SCYTHE
SNATHS, Etc.

For export and
home trade.

Catalog free on ap-
plication.

FT. MADISON,
IOWA, U. S. A.



KNOCKED DOWN!

Occupies Space
3 inches x 5 inches x 60 inches.

Suppose

The best's the cheapest

You had a good thing to sell.
We had a good thing to sell.
You bought what we had to sell.
You sold what we had to sell.
The customer thought it the best of all.
What would be the result of this supposition?
If you can't guess it and would like to know,
And will drop us a card we'll tell you.

FOURTH REVISED EDITION.

THE IRON AGE STANDARD HARDWARE LISTS

FOR USE IN PRICE BOOKS.

Compiled by R. R. WILLIAMS, Hardware Editor of The Iron Age.

This pamphlet contains the principal standard Hardware price-lists in as clear and compact an arrangement as possible, so as to permit their being advantageously cut out and inserted in the price book. In order to make them adapted to this use they are printed on thin and tough paper of fine quality and on only one side of the paper.

Saucepans and Round Boilers.

Pnts.	Plain	Turnd.	Tind or End.
1	\$0.30	.35	.39
1 1/2	.32	.37	.44
2	.35	.39	.48
3	.42	.47	.56
Quarts.			
2	.50	.56	.63
2 1/2	.53	.59	.68
3	.55	.62	.73
4	.60	.68	.84
5	.65	.75	.96
6	.70	.81	1.11
7	.75	.84	1.21
Gallons.			
2	.85	.96	1.31
2 1/2	1.05	1.18	1.56
3	1.20	1.35	1.70

The success of the effort to give the lists in small space is illustrated in many of the lists, in which a clear and condensed arrangement is secured. For instance, the wrench list occupies but 3 inches by 1/4 inch, while the list of Stove Hollow Ware, in very small space, gives the list prices on a large and important line of goods which often occupy several pages in catalogues. In several lists, such as Strap and T Hinges and Butts, a new arrangement is adopted, which is regarded as presenting these lists in a very convenient as well as condensed form.

As is obvious from the lists herewith reproduced, the shape and size of the different lists varies greatly, the aim being to give each list the smallest and most convenient arrangement possible. None of the lists are, however, more than 3 1/4 x 6 inches in size, very few of them being as large as this and most of them very much smaller. In use it is intended that they shall be trimmed closely before they are inserted in price books,

when they may be attached either by one edge close to the hinge of the book, as will, perhaps, be most convenient with the larger lists, permitting the use of the entire page for memoranda, or the smaller lists may be pasted on the page in connection with the entries in regard to discounts, freights, &c. Many of the lists are so compact in arrangement as when thus inserted to leave ample room for recording quotations.

Wrenches. Standard List.

Inches.	6	8	10	12	15	18	21
Black...	\$9.00	\$10.00	\$12.00	\$14.00	\$24.00	\$30.00	\$36.00
Bright..	10.00	11.00	14.00	16.00	26.00	32.00	38.00

Some merchants use this pamphlet for reference, checking off invoices, etc., as it gives the leading lists in a more convenient form than they can otherwise be obtained. The lists are, however, intended primarily to be cut out

and inserted in price books, and can be used in connection with any of The Iron Age Hardware Price Books.

That the Standard Hardware Price Lists meet a want of the trade is evident from the fact that a Third edition is already called for.

EVERY HARDWAREMAN SHOULD HAVE A COPY. Price 25 cts.

Stove Hollow Ware.

Ground and Unground.

POTS, KETTLES, ETC. (CAST IRON.)						
No.....	6	7	8	9	10	11
Pots.....	\$0.65	.75	.85	1.00	1.25	1.75
Kettles.....	.55	.65	.70	.85	1.00	1.40
T Kettles.....	.75	.80	.90	1.00	1.25	....
Spiders.....	.27	.30	.35	.40	.50	.60
Griddles Round	.22	.25	.27	.30	....	....
“ Long..	.40	.50	.60	.75	....	....

SCOTCH AND YANKEE BOWLS.

No.	1	2	3	4	5	6
Scotch Bowls..	\$0.35	.40	.45	.50	.60	.70
Yankee Bowls.	.35	.45	.55	.65	.75	.90

Glue Pots.

Tinned or Enameled

No.	4/0	5/0	6/0	7/0	8/0	9/0
4/0....	\$4.50	5.00	5.50	6.00	6.75	7.50
5/0....	5.00	5.50	6.00	6.75	7.50	8.25
6/0....	5.50	6.00	6.75	7.50	8.25	9.00
7/0....	6.00	6.75	7.50	8.25	9.00	9.75
8/0....	6.75	7.50	8.25	9.00	9.75	10.50
9/0....	7.50	8.25	9.00	9.75	10.50	11.25

Sent, postpaid, on receipt of price, by DAVID WILLIAMS, Publisher, 96-102 Reade Street, New York.

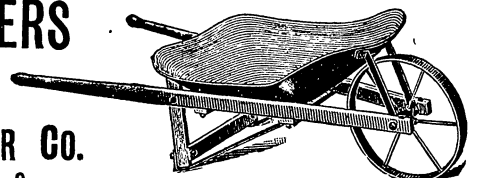
ALL STEEL

WHEELBARROWS & SCRAPERS

MANUFACTURED BY

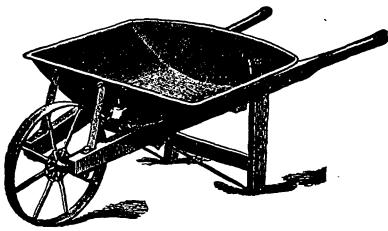
AMERICAN STEEL SCRAPER CO.

104 Court Street, SIDNEY, O.



Write for Catalogue

HARD PAN Prices,



High Grade Goods, Prompt Shipments are what you receive from the

Sidney Steel Scraper Co., 924 Poplar Street, SIDNEY, OHIO.

C. L. PLEUGER, Prest. and Gen'l. Manager.

H. W. HENGER, Treasurer.

B. H. SANDERS, Superintendent

Ette & Henger Mfg. Co.,

Lawn Sprinklers,

Hose Nozzles,

Spray Nozzles,

Hose Couplings,

Gate Hinges,

Blind Hinges,

Grindstone Fixtures,

Family Grindstones,

Well Wheels,

Hay Fork Pulleys,

Axle Pulleys,

Shoe Lasts and Stands,

Barn Door Hangers,

Sliding Door Hangers,

Latches,

GRAY IRON
and BRASS } HARDWARE
SPECIALTIES.

Plumbers' and
Water Works
Specialties.

Send for New Catalogue.

Door Hinges,

Mauls,

Tuyeres,

Tire Drills,

Dog Irons,

Pump Fixtures,

Common Sad Irons,

Cold Handle Sad Irons,

Shelf Brackets,

Hand Rail Brackets,

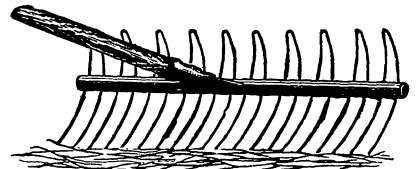
Plated Brackets,

Brass Cocks,

Petroleum Cocks,

Signal Gongs,

Etc., Etc.



Lead and Others Follow.

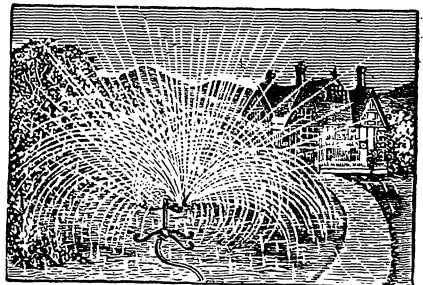
We manufacture the ORIGINALS; others follow! But to lead in prices and quality is the success of our Post-hole Diggers, Reversible Lawn-rakes, Spring Curry-combs, Saw-sets etc.

F. E. KOHLER & CO.,
CANTON, OHIO.

GENUINE

"CALIFORNIA"

Lawn Sprinkler.



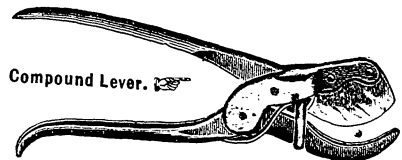
MANUFACTURED BY

BLAIR MANUFACTURING CO.
SPRINGFIELD, MASS.

Write for prices.

Also makers of the most complete line of Lawn Mowers on the market.

"PERFECT" PRUNING SHEARS.



Compound Lever.

A strictly first-class tool, entirely new in construction. Has a rapid action that produces a clean cut with twice the ease of other shears. Try a sample order and prove its superiority. We give it our full guarantee.

Our line comprises Lawn Rakes, Garden Rakes, Lawn Sprinklers, Post Hole Diggers, Curry Combs, etc.

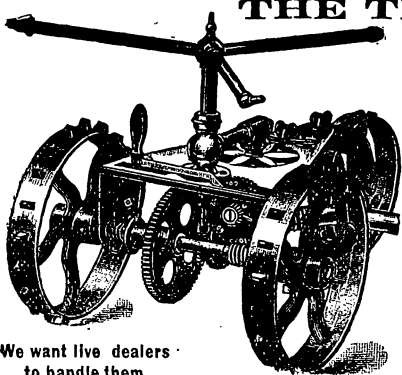
WRITE FOR PRICES.

GIBBS MFG. CO., Canton, Ohio.

EXPANSION BOLTS:



Manufacturers of Single and Double. For fastening all kinds of Structure to Brick and Stone Work. Catalogue furnished on application.
STEWART & ROMAINE MFG. CO., - Philadelphia.



We want live dealers to handle them.

THE TEST OF 2 SEASONS

PROVES THE SUCCESS OF THE

LITTLE GIANT

Traveling Lawn Sprinkler.

PATENTED.

Can be set to travel anywhere from 15 to 500 feet per hour, either on a straight line or in a circle, and can be gauged to throw water over a swath 5 to 50 ft. in width. Highest Award at World's Columbian Exhibition.

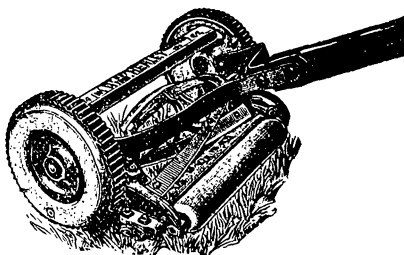
SEND FOR CIRCULAR.

Portland Lawn Sprinkler Co.,
PORTLAND, ME.

HENLEY'S MOWERS

For Lawns and Parks

Are first class, high grade machines, made of the best materials, neat, symmetrical, strong and unexcelled in construction and ease of operation. Does perfect work. For prices, address



M. C. HENLEY, Sole Mfr., Richmond, Ind., U. S. A.

EASTERN REPRESENTATIVES: H. S. Earle, 110 and 112 N. Warren St., Syracuse, N. Y.; Wm. H. Cole & Sons, 13 S. Charles St., Baltimore, Md.; Carpenter & Bayles, 91 Chambers St., New York City.

Electric Toy Making, Dynamo Building and Electric-Motor Construction. By T. O'CONOR SLOAN, A.M., E.M., Ph.D. This work treats of the making at home of electrical toys, electrical apparatus, motors, dynamos, and instruments in general and is designed to bring within the reach of young and old the manufacture of genuine and useful electrical appliances. The work is specially designed for amateurs and young folks. Very fully illustrated. . . . \$1.00

For sale by David Williams 96-102 Reade St., N. Y.

The New Britain Hardware Mfg. Co.

New Britain, Conn., U. S. A.

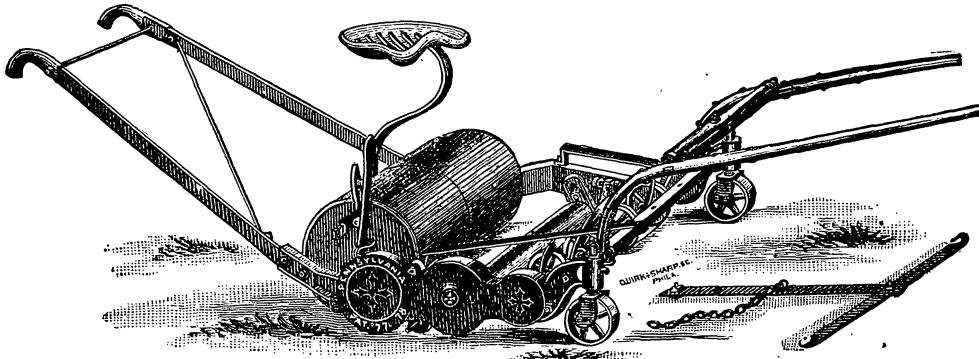
—MAKERS OF ALL KINDS OF—

Special Machine Screws, Studs, Bolts, &c
BICYCLE PARTS,
SPECIAL HARDWARE.

Pattern Makers' Dowels and Emery Wheel Dressers
Electro, Brass and Nickel Plating.

PENNSYLVANIA HORSE LAWN MOWERS.

Made in
both open
and solid
cylinder.



Almost
noiseless
in
operation

Conceded by all who have used them to be the best and most durable Horse Mower on the market.

LIST, OPEN CYLINDER WITH DRAFT IRONS, \$110.00.
" SOLID " " " " 100.00.

PLEASE WRITE FOR DISCOUNTS.

SUPPLEE HARDWARE CO., - PHILADELPHIA.

McGuire's ♦ Diamond.

MANUFACTURED BY

Dille & McGuire Mfg. Co.,
RICHMOND, IND., U. S. A.

PRICE-LIST.

Wheels, 8 Inches High. Cutter, 5½ Inches Diameter.

LENGTH.	LIST.
10 Inch	\$13.00
12 "	14.00
14 "	15.00
16 "	16.00
18 "	17.00

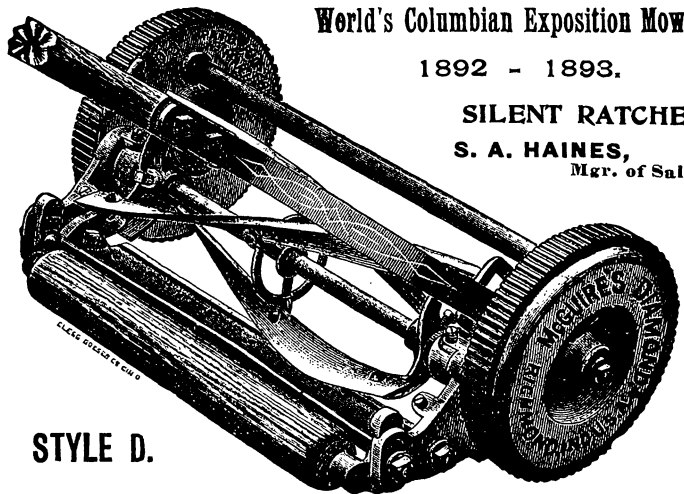
Discount to the
Trade,
70 per cent.,
F.O.B. Factory.

PHOSPHOR BRONZE JOURNAL BEARINGS. BEST QUALITY STEEL.

This is the Mower contracted for by the Chief of Construction at the Columbian Exposition; was used on the lawns at the World's Fair grounds during the preparatory season of 1892, and being approved by the Landscape Architects, was adopted exclusively for 1893.

If you wish a first-class mower in all respects, one that is fully warranted,

— **BUY MCGUIRE'S DIAMOND.** —



STYLE D.

— **OFFICIAL** —
World's Columbian Exposition Mower.

1892 - 1893.

SILENT RATCHET.

S. A. HAINES,
Mgr. of Sales.

Chadborn & Coldwell Mfg. Co.,

NEWBURGH, N. Y.,

— Sole Manufacturers of —



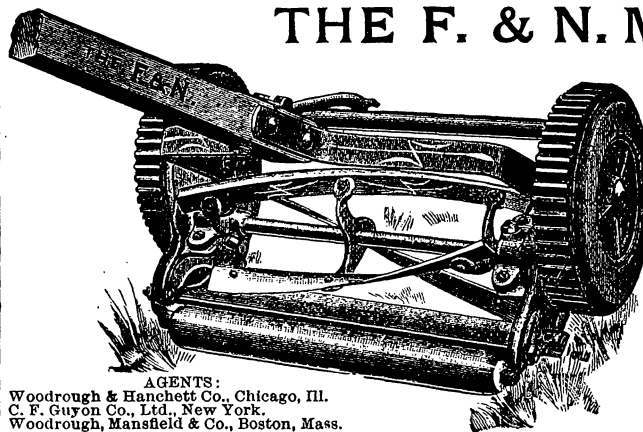
New Model
AND
Excelsior
LAWN
MOWERS
ALSO
The Rival,
The O K,
Etc., Etc.

Send for Illustrated Catalogue.

THE F. & N. MFG. CO.,

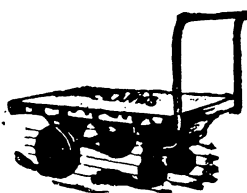
Manufacturers of
Lawn Mowers
and
Grass Catchers
RICHMOND, IND., U. S. A.

**THE
F. & N.
LAWN
MOWER
" '94."**



AGENTS:
Woodrugh & Hanchett Co., Chicago, Ill.
C. F. Guyon Co., Ltd., New York.
Woodrugh, Mansfield & Co., Boston, Mass.

Solid Steel Cutter Bar. Reel
Knives adjusted to Cutter
Bar. Phosphor Bronze Reel
Bearings.

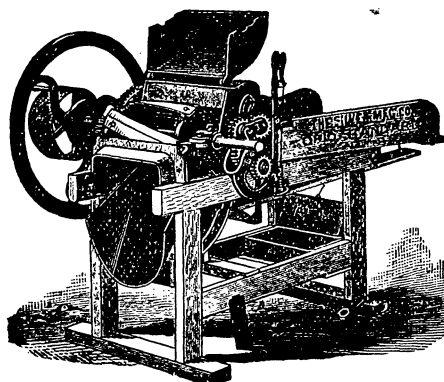


TRUCKS of all
kinds. Mounted
on rubber or
iron wheels. Trucks
made to order.
Write for prices.
Catalogues free.

G. P. CLARK, Box 0.
Windsor Locks Conn

**THE "OHIO" Feed and
Ensilage Cutters and Car-
riers are the best.**

By reason of wide open throat
and improved feeding device
(being full width of cutting sur-
face, all sizes), our machines
have greater capacity than others.



THE SILVER MFG. CO. Salem, O.

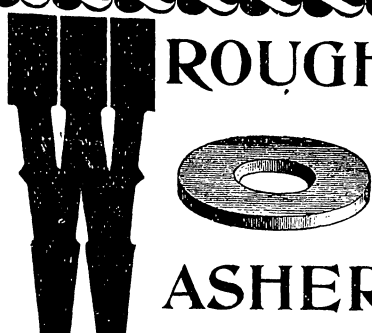
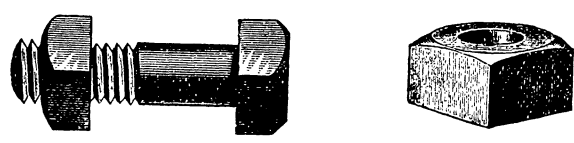
THE STAR
COIL SPRING SHAFT SUPPORT
AND ANTI-RATTLER.

GET THE BEST!

Past selling always gives satisfaction. No
weight on horse. Worth twice the cost for conve-
nience in hitching up. Agents wanted. Send stamp
for circular. Price, \$1.50. State rights for sale.

THE DECATUR SHAFT SUPPORT CO.
Decatur, Ill.

SELLS AT SIGHT

 <p>WROUGHT WASHERS</p> <p>True to Gauge</p> <p>Made from specially rolled plate by our own patented machinery. Every washer flat, with hole in true center. Sold in 200 lb. kegs, or 1 and 5 lb. paper boxes.</p> <p>Get prices.</p>	<p>HIGH GRADE</p>  <p>Machine Bolts | Hot pressed Nuts</p> <p>Stamped to size. Guaranteed extra quality. Send for catalogue.</p>
---	---

THE MILTON MANUFACTURING CO., MILTON, PA.

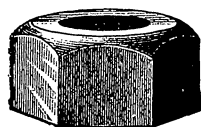
Pennsylvania Bolt & Nut Co.
Lebanon Pa.

MANUFACTURERS OF

REFINED BAR IRON	MACHINE BOLTS	TRACK BOLTS	& BOLT-ENDS
LAG-SCREWS	GIMLET-POINTED COACH SCREWS	HOT PRESSED & COLD PUNCHED SQUARE & HEXAGON NUTS	
CHAMFERED & TRIMMED NUTS	WROUGHT & CAST WASHERS	TURN-BUCKLES	
STRUCTURAL & ELECTRICAL FORGINGS	BOILER & BRIDGE RIVETS	CAR FORGINGS & ARCH-BARS	

BOLTS, Machine, Car, Track, Pipe, Loom. | **NUTS,** Cold Punched

AMERICAN BOLT COMPANY, - - Lowell, Mass.



PORTCHESTER BOLT & NUT CO.

Port Chester, N. Y.

MANUFACTURERS OF



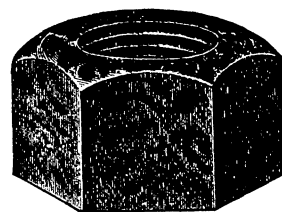
BOLTS, NUTS, RIVETS and WASHERS
CHAMFERED AND TRIMMED.
SQUARE AND HEXAGON NUTS A SPECIALTY.

DUNHAM NUT CO.,

UNIONVILLE, CONN.,

Manufacturers of

All Grades
of
Finished
Nuts
and

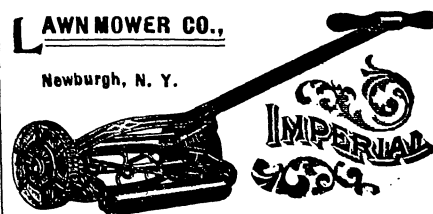


Automatic Cold Press Nut Machines.
SEND FOR CATALOGUE.

MAKE a specialty of
CAST IRON
(not Tin Scrap)
WASHERS.
ANY WEIGHT; ANY STYLE.
—Write for Prices.—
JAY HERBERT NEWBURY, Guildenland, N. Y.

**COLDWELL
LAWN MOWER CO.,**

Newburgh, N. Y.



THE BEST MOWER MADE.

The Lightest Running Mower in the World.

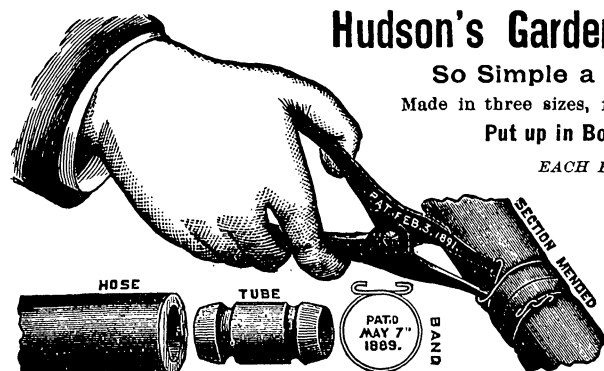
This is the only Lawn Mower that stood the test of working the entire season on the Columbian Exposition Grounds without any repairs.

Hudson's Garden Hose Mender.
So Simple a Child Can Use It.
Made in three sizes, for 1/2 in., 3/4 in. and 1 in. hose.
Put up in Boxes for Family use.

EACH BOX CONTAINS:

1 Pair Pliers,
20 Bands,
6 Tubes.

Sells readily at 75 cents.
Liberal discount to Dealers.
Send for Full Description.



C. E. HUDSON & CO., Manufacturers, Leominster, Mass.

BOOKS. YOU CAN OBTAIN PROMPTLY the latest work on any subject in which you are interested by addressing **DAVID WILLIAMS, Publisher** and bookseller, 96-102 Reade St., New York

WM. H. HASKELL, PRESIDENT.

E. S. MASON, TREASURER.

D. A. HUNT, AGENT.

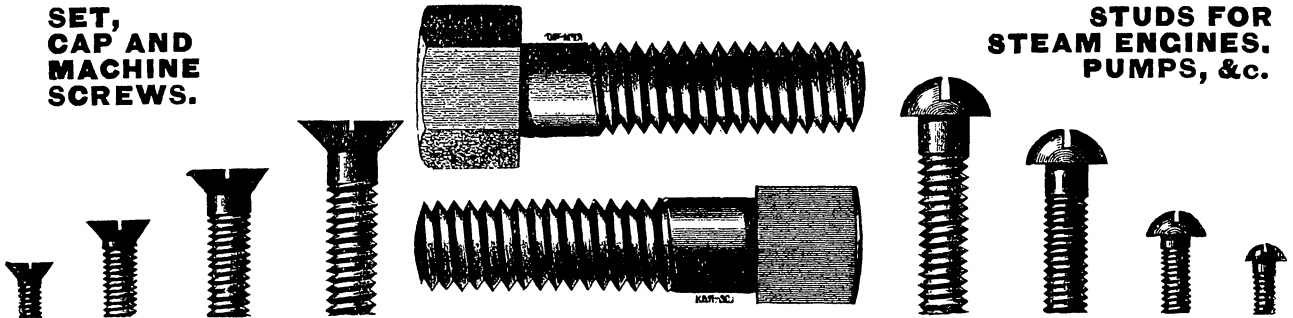


WM. H. HASKELL CO.,
—MANUFACTURERS OF—
GIMLET POINT COACH SCREWS
Bolts, Cold-Punched Nuts and Washers, SUITABLE FOR MACHINERY OF ALL KINDS.

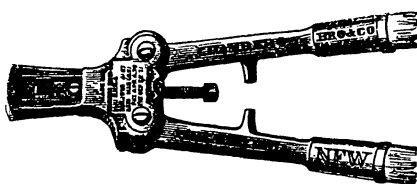
Office and Works: 451 Main St., PAWTUCKET, R. I., U. S. A.
HENRY B. NEWHALL CO., Agents,
105 CHAMBERS STREET, NEW YORK. - 47 PEARL STREET, BOSTON.

WORCESTER MACHINE SCREW CO., Worcester, Mass.

MANUFACTURERS OF

SET,
CAP AND
MACHINE
SCREWS.STUDS FOR
STEAM ENGINES.
PUMPS, &c.**EXPANSION BOLTS.**

For Fastening all Kinds of Structure to Brick and Stone Work.

Patentee and Mfr. **ISAAC CHURCH,**
Send for Catalogue. 1521 Walnut St., TOLEDO, O.**BOLT & RIVET CLIPPERS,**For cutting off the ends of Bolts and Rivets.
Liberal discounts to the trade.**CHAMBERS BROTHERS COMPANY**52d St., BELOW LANCASTER AVE.,
PHILADELPHIA, PA.**WM. H. JACOBUS,**

No. 90 Chambers St., New York.

New York Office of

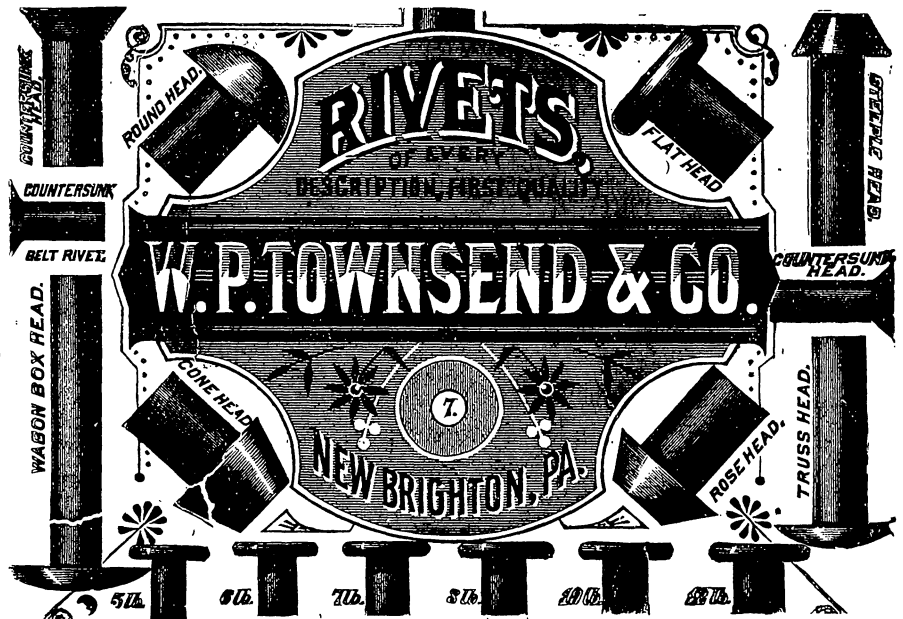
J. F. Wollensak.
Barnes Mfg. Co.
N. R. Streeter & Co.
Geo. W. Nock.
Tuck Mfg. Co.

Henis Vegetable Press.
Dille & McGuire Mfg. Co.
Bommer Bros.
Palmer Hdw. Mfg. Co.
Wire Goods Co.

National Rivet Works.
Wolcott Hdw. Co.
Fibre Head Mallet.
Burns & Cedar Faucets.
Cleveland Window Shade Co.

Zimmerman's Blind Adjusters.
Garritt & Beach
Wilcox Mfg. Co.
M. B. Schenck & Co.
Hemacite Mfg. Co.

Franklin Mfg. Co.
Atlas Mfg. Co.
National Specialty Mfg. Co., Ltd.



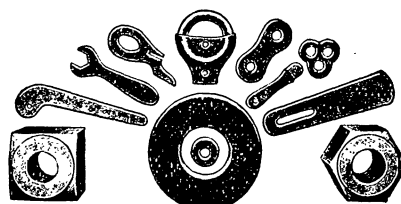
RIVETS
OF EVERY
DESCRIPTION, FIRST QUALITY
W.P. TOWNSEND & CO.
NEW BRIGHTON, PA.

ROUND HEAD, FLAT HEAD, CONE HEAD, ROSE HEAD, TRUSS HEAD, COUNTERSUNK HEAD, BELT RIVET, WAGON BOX HEAD.

ESTABLISHED 1865.

J. H. Sternbergh & Son, READING, PENNA.**Bolts, Nuts, Washers, Rivets.**

Send for our New Catalogue and Discounts.



J. FRED WILSON, Worcester, Mass.

Metal Punching AND Die Work.

Cold Punched Nuts and Washers for all Purposes.

SEND FOR PRICES ON
SPECIALTIES IN LINE OF PRESS WORK.

CLASSIFIED LIST OF ADVERTISERS.

Agricultural Implements.

Iowa Farming Tool Co., Ft. Madison Iowa.
Sickles, Sweet & Lyon, 35 Barclay St. N. Y.

Air Compressors.

Norwalk Iron Works, S. Norwalk.

Air Moving Machinery.

Howard & Morse, 45 Fulton, N. Y.

Aluminum.

Illinois Pure Aluminum Co., Lemont, Ill.
Pittsburgh Reduction Co., Pittsburgh.
Seovill Mfg. Co., Waterbury, Conn.
Wohler Aluminum Co., Chicago, Ill.

Aluminum, Brass and Bronze.

Gaylord, F. L. Co., Ansonia, Conn.
Haight & Clark, Albany, N. Y.
Frait & Cady Co., Hartford, Conn.

Analytical Chemists.

Britton, J. Blodgett, Philadelphia, Pa.
Moore, Dr. Gideon E., 221 Pearl St., N. Y.

Anti-Friction Metals.—See Babbitt Metal.

Anvil and Vise (Combination).

Fulton Iron & Engine Works, Detroit, Mich.

Apple Parers.

Goodell Co., Antrim, N. H.

Arms and Ammunition.

Chicago Fire Arms Co., Chicago, Ill.
Hartley & Graham, 313 & 315 Broadway, New York.
Ideal Mfg. Co., New Haven, Conn.
Stevens, J. Arms and Tool Co., Chicopee Falls, Mass.
Union Metallic Cartridge Co., 313 & 315 Broadway, N. Y.

Attorney at Law.

Coleman, I. A., Chicago, Ill.

Auctioneers.

Bissell, E. Son & Co., N. Y.

Axes.

Peck, A. G. & Co., Cohoes, N. Y.

Axles, Springs, &c., Manufacturers of.

Gautier Steel Dept. of Cambria Iron Co., Johnstown, Pa.
Wurster, F. W. & Co., Brooklyn, N. Y.

Babbitt Metal.

Crown Smelting Co., Chester, Pa.
Hertz, T. & Son, St. Louis, Mo.
Keys, W. W. & R. M. Co., Bridgeport, Conn.
Reeves, Paul S., Philadelphia, Pa.

Bakers and Roasters.

Bronson Supply Co., Cleveland, Ohio.

Bale Ties.

Kilmer Mfg. Co., Newburg, N. Y.

Barb Wire and Fence.

Gautier Steel Dept. of Cambria Iron Co., Johnstown, Pa.
Indiana Wire Fence Co., Crawfordsville, Ind.
Kilmer Mfg. Co., Newburg, N. Y.
Ludlow-Saylor Wire Co., St. Louis, Mo.
Washburn & Moen Mfg. Co., Worcester.

Bar Iron, Manufacturers of.

Aetna-Standard Iron & Steel Co., Bridgeport, Ohio.
Allentown Rolling Mill, Allentown, Pa.
Burden Iron Co., Troy, N. Y.
Crescent Horse Shoe & Iron Co., Max Meadows, Va.
Montour Iron & Steel Co., Danville, Pa.
Mahoning Valley Iron Co., Youngstown, Ohio.
Sternbergh, J. H. & Son, Reading, Pa.

Barrel Openers.

Specialty Mfg. Co., Hartford, Conn.

Bellows, Manufacturers of.

Scott, Geo. M., Chicago, Ill.

Bells.

Bevin Bros. Mfg. Co., East Hampton.

Belt Dressing.

Jos. Dixon Crucible Co., Jersey City, N. J.

Belt Fasteners.

Bristol Co., Waterbury, Conn.
Claffen Mfg. Co., Cleveland, Ohio.
Talcott, W. O., Providence, R. I.

Belting, Makers of.

Alexander Bros., 412 N. 3d, Phila.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Engineering Co., Phila., Pa.
Main Belting Co., Philadelphia, Pa.
N. Y. Belting & Packing Co., Ltd., N. Y.
Roberts Mfg. Co., Pittsburgh, Pa.
Shultz Belting Co., St. Louis, Mo.
Stanley Works, New Britain, Conn.

Bicycle Locks.

Independent Electric Co., Chicago, Ill.

Bicycles and Bicycle Sundries.

Bevin Bros. Mfg. Co., E. Hampton, Mass.
Black Mfg. Co., Erie, Pa.
Bridgeport Gun Implement Co., 313-315 Broadway, New York.

Crawford Mfg. Co., Hagerstown, Md.
Eagle Bicycle Mfg. Co., Torrington, Ct.
Eclipse Bicycle Co., Beaver Falls, Pa.
Grand Rapids Cycle Co., Grand Rapids, Mich.
Harris Mfg. Co., Buffalo, N. Y.
League Cycle Co., Hartford, Conn.
Lovell, Jno. P. Arms Co., Boston, Mass.
Pope Mfg. Co., Boston, Mass.
Read, Wm. & Sons, Boston, Mass.
Stearns, E. C. & Co., Syracuse, N. Y.
Sterling Cycle Works, Chicago, Ill.

Bicycle Parts.

New Britain Hdw. Mfg. Co., New Britain, Conn.

Bit Braces.

Amidon Tool Corp., Buffalo, N. Y.

Blocks, Tackle, Makers of.

Cleveland Block Co., Cleveland, O.
Fulton Iron & Engine Works, Detroit, Mich.

Blowers.

Buffalo Forge Co., Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Sturtevant, B. F. & Co., Boston, Mass.

Boiler Plates.

Carbon Steel Co., Pittsburgh, Pa.
McIlwain, Wm. & Sons, Reading, Pa.
Lukens Iron & Steel Co., Coatesville, Pa.
Pottstown Iron Co., Pottstown, Pa.

Boilers, Copper.

Randolph & Clowes, Waterbury, Conn.

Boilers, Steam.

Babcock & Wilcox Co., 30 Cortlandt.
Harrison Safety Boiler Wks., Phila., Pa.
Pollock, W. B. & Co., Youngstown, O.
Porter, H. K., Boston, Mass.
Southwark Fdy. & Mch. Co., Phila., Pa.
Sterling Co., Chicago, Ill.
Wetherill, Robt. & Co., Chester, Pa.

Bolt Cutters.

Chambers Bros. Co., Philadelphia.
Howard Iron Works, Buffalo, N. Y.
Reece, Edw. F., Greenfield, Mass.
Wells Bros. & Co., Greenfield, Mass.

Books.

Republic Press, 14 Lafayette Place, N. Y.
Williams, David, 96-102 Reade, N. Y.

Box Banders.

Goodell, J. W., Burlington, Vt.

Box Straps and Corners.

Cary Mfg. Co., 5 to 9 Elm St., N. Y.
De Haven Mfg. Co., Brooklyn, N. Y.

Boxes, Hdw. Shelf, &c.

Green, A. H., 22 Park Place, N. Y.

Brass, Manufacturers of.

Ansonia Brass & Copper Co., N. Y.
Devol, John & Sons, 400 John, N. Y.
Plum & Atwood Mfg. Co., N. Y.
Randolph & Clowes, Waterbury, Conn.
Rome Brass & Copper Co., Rome, N. Y.
Seovill Mfg. Co., Waterbury, Conn.
Waterbury Brass Co., 296 E'way, N. Y.

Brass Butt Hinges.

Tiebout, W. & J., 16 & 18 Chambers.

Brass Founders.

Cramp, Wm. & Sons S. & E. B. Co., Philadelphia, Pa.
Eynons-Evans Mfg. Co., Philadelphia, Pa.
Fralm, E. T., Lancaster, Pa.
Haight & Clark, Albany, N. Y.
Keys, W. W. & R. M. Co., Bridgeport, Conn.
North Bros. Mfg. Co., Phila., Pa.
Reeves, Paul S., Philadelphia.

Brass Goods.

Brass Goods Mfg. Co., 88 Chambers.

Bread and Cake Knives.

Cincinnati Mfg. Co., Cincinnati, O.
Claus Shear Co., Fremont, O.

Bronze (Tobin).

Ansonia Bronze & Copper Co., 19-21 Cliff Street, N. Y.

Brooms and Brushes.

Rice Mfg. Co., New Durham, N. H.

Builders' Hardware.

Deitz, A. E., 97 Chambers St., N. Y.
Reading Hdw. Co., Reading, Pa.
Yale & Towne Mfg. Co., Stamford, Ct.

Butchers' Steels.

Chatillon, John & Sons, 85-89 Cliff St., N. Y.

Butcher and Shoe Knives, Manufacturers of.

Chatillon, John & Sons, 85-89 Cliff St.
Goodell Co., Antrim, N. H.
Wilson, John, Sheffield, England.

Butts and Hinges.

McKinney Mfg. Co., Allegheny, Pa.
Sabin Machine Co., Montpelier, Vt.
Stanley Works, New Britain, Conn.
Tiebout, W. & J., 16 Chambers, N. Y.
Wrightsville Hdw. Co., Wrightsville, Pa.

Calipers and Dividers.

J. Stevens Arms and Tool Co., Chicopee Falls, Mass.
Starrett, L. S., Athol, Mass.

Car Axles.

Roberts, A. & P. & Co., Phila.

Carboy Stands.

Wolf, W. & L., Philadelphia, Pa.

Carriage Hardware, Makers of.

Clapp, E. D. Mfg. Co., Auburn, N. Y.
Covett's Saddlery Works, Farmer, N. Y.
Eccles, Richard, Auburn, N. Y.
Scranton Forging Co., Scranton, Pa.
Smith, H. D. & Co., Plantsville, Conn.

Cartridge Reloading Tools.

Ideal Mfg. Co., New Haven, Conn.

Carvers' Tools.

White, Van Glahn & Co., 15-17 Chat-ham Square, N. Y.

Casters, Wheel, &c.

Clark G. P., Windsor Locks, Conn.

Castings, Iron and Steel.

Allentown Hdw. Wks. Allentown, Pa.
Booth, The Lloyd Co., Youngstown, O.
Boston Casting Co., So. Boston, Mass.
The Burr & Houston Co., Brooklyn, N. Y.
Cheney, S. & Son., Manlius, N. Y.
Chester Steel Casting Co., Phila.
Chrome Steel Works, Brooklyn, N. Y.
Eureka Cast Steel Co., Chester, Pa.
Flag, Stanley G. & Co., Phila.
Gartland Foundry Co., Cleveland, O.
Haight & Clark, Albany, N. Y.
King & Andrews Co., Chicago, Ill.
Palmer & De Mooy Fdry. Co., Cleveland, O.
Pratt & Cady Co., Hartford, Conn.
Sessions Foundry Co., Bristol, Conn.
Spencer's I. S. Sons, Guilford, Conn.
Standard Fdy. & Mfg. Co., Cleveland, O.
Walker Mfg. Co., Cleveland, Ohio.
Wetherill, Robert & Co., Chester, Pa.

Castings, Malleable.

Arade Malleable Iron Co., Worcester, Mass.
Hammer & Co., Branford, Conn.

Catalogue Files.

Folding Paper Box Co., So. Bend, Ind.

Chains.

Bradlee & Co., Philadelphia.
Link Belt Engineering Co., Phila., Pa.
McKay, Jas. & Co., Pittsburgh, Pa.

Chimneys.

Phila. Engineering Works, Phila., Pa.

Cherry Stoners.

Enterprise Mfg. Co., Phila., Pa.

Chisels, Manufacturers of.

Buck Bros., Millbury, Mass.
Buck, Chas., Millbury, Mass.
White, L. & I. J. Co., Buffalo, N. Y.

Chucks.

Cushman Chuck Co., Hartford, Conn.
Skinner Chuck Co., New Britain, Conn.
Smith & Egge Mfg. Co., Bridgeport.
Union Mfg. Co., 103 Chambers, N. Y.
Whitlock, Wm., 39 Cortlandt St., N. Y.
Whiton, D. E. Mach. Co., New London, Conn.

Clamps.

Hammer & Co., Branford, Conn.
Le Count, C. W., So. Norwalk, Conn.

Coal.

Barns, C. K. & Co., Philadelphia, Pa.
Wister, Francis, Philadelphia, Pa.

Coffee Mills.

Parker, Chas. Co., Meriden, Conn.

Coke.

Barns, C. K. & Co., Philadelphia, Pa.
Houston, C. B. & Co., Philadelphia, Pa.
Rahey, W. J., Cleveland, O.
Wister, Francis, Philadelphia, Pa.

Collections.

Hardware Board of Trade (Limited), 4 and 6 Warren, N. Y.

Condensers.

Worthington, Henry R., 86 & 88 Liberty Street, N. Y.

Conveying Machinery.

Brown Hoisting & Conveying Machine Co., Cleveland, Ohio.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Engineering Co., Phila., Pa.

Copper.

Ames Sword Co., Chicopee, Mass.
Ansonia Brass & Copper Co., 19 and 21 Cliff, N. Y.
Bendricks Bros., 49 Cliff, N. Y.
New Haven Copper Co., 394 Pearl, N. Y.
Randolph & Clowes, Waterbury, Conn.
Rome Brass & Copper Co., Rome, N. Y.
Wister, Francis, Philadelphia, Pa.

Cordage.

Samson Cordage Works, Boston, Mass.

Cork Screws.

Williamson, C. T. Wire Novelty Co., Newark, N. J.

Corrugated Furnaces.

Continental Iron Wks., Brooklyn, N. Y.

Corrugated Iron.

Cincinnati Corrugating Co., Piqua, O.
Cambridge Roofing Co., Cambridge.
Jersey City Galvanizing Co., 112 John St., N. Y.
Moseley Iron Bridge & Roof Co., 5 Day, N. Y.
N. Y. Iron Roofing & Corrugating Co., Jersey City, N. J.

Counting Machines.

Durant, W. N., Milwaukee, Wis.

Cranes.

Halsey, W. S. & Co., Birdsboro, Pa.
Maris & Beekley, Philadelphia, Pa.
Ridgway, Craig & Sons, Coatesville, Pa.
Sellers, Wm. & Co., Inc., Phila., Pa.
Whiting Foundry Equipment Co., Chicago, Ill.
Yale & Towne Mfg. Co., Stamford, Conn.

Cupolas, Hot Blast.

Whiting Foundry Equipment Co., Chicago, Ill.

Cutlery, Importers of.

Sickles, Sweet & Lyon, 35 Barclay, N. Y.

Cutlery, Manufacturers of.

Bingham, W. Co., Cleveland, Ohio.
Dane, Stoddard & Kendall, Boston, Mass.
Goodell Co., Antrim, N. H.
Northampton Cutlery Co., Northampton, Mass.
Wilson, John, Sheffield, England.

Cutlery Display Cases.

Union Show Case Co., Chicago, Ill.

Cyclometers.

Bridgeport Gun Implement Co., 313-315 Broadway, N. Y.

Dampers.

Arcade Mfg. Co., Freeport, Ill.
Shepard, Sidney & Co., Buffalo, N. Y.

Dies.

Wilson, J. Fred, Worcester, Mass.

Die Forgings and Castings.

Bliss, E. W. Co., Brooklyn, N. Y.

Door Checks and Springs.

Bardsley, J., 149 & 151 Baxter St., N. Y.

Door Knobs.

Perry & Whipple Co., New Haven, Ct.

Door Springs.

Colled Wire Belting Co., Jersey City, N. J.

Drilling Machines.

Bickford Drill & Tool Co., Cin., Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Colburn, A. M., New Haven, Conn.
Dallett, Thos. H. & Co., Philadelphia.
Dietz, Schumacher & Co., Cincinnati, Ohio.
Dwight Slate Machine Co., Hartford, Conn.
Goddard, Asa, Worcester, Mass.
Halsey, Jas. T., Philadelphia, Pa.
Hamilton Mch. Tool Co., Hamilton, O.
Penna. Diamond Drill & Mfg. Co., Birdsboro, Pa.
Quint, A. D., Hartford, Conn.
Sellers, Wm. & Co., Inc., Phila., Pa.
Sigourney Tool Co., Hartford, Conn.
Silver Mfg. Co., Salem, O.
Wiley & Russell Mfg. Co., Greenfield, Mass.

Drop Forgings.

Billings & Spencer Co., Hartford, Conn.
Boone, W. C. Mfg. Co., Bonton, N. J.
Clapp, E. D. Mfg. Co., Auburn, N. Y.
Eccles, Richard, Auburn, N. Y.
Merrill Bros., Brooklyn, E. D.
Miner & Peck Mfg. Co., New Haven, Ct.
Phila. Drop Forge Co., Phila., Pa.
Scranton Forging Co., Scranton, Pa.
Wilcox & Howe Co., Birmingham, Conn.
Williams, J. H. & Co., Brooklyn, N. Y.
Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
Wyman & Gordon, Worcester, Mass.

Drop Presses.

Bliss, E. W. Co., Brooklyn, N. Y.
Crosby, G. A. & Co., Chicago, Ill.
Miner & Peck Mfg. Co., New Haven, Conn.
Stiles & Parker Press Co., Brooklyn, N. Y.
Vulcan Iron Works, Chicago, Ill.
Waterbury Farrel Foundry and Machine Co., Waterbury, Conn.

Dumb Waiters.

Hutchinson, F. S. Co., 32 Warren Street, N. Y.
Storm Mfg. Co., Newark, N. J.

Dynamite.

New York Powder Co., 62 Liberty St., N. Y.

Dynamos.

C. & C. Electric Co., 402 and 404 Greenwich St., N. Y.
Colburn Electric Mfg. Co., Fitchburg, Mass.

Edge Tools, Makers of.

Buck Bros., Millbury, Mass.
Buck, Chas., Millbury, Mass.
Plumb, Layette R., Philadelphia, Pa.
White, L. & I. J. Co., Buffalo, N. Y.

Edging Shears.

Dillie & McGuire Mfg. Co., Richmond, Ind.

Egg Beaters.

North Bros. Mfg. Co., Philadelphia, Pa.

Electric Bells and Supplies.Ostrander, W. R. & Co., 204 Fulton St., New York.
Wollensak, J. F., Chicago, Ill.**Elevators, Makers of.**Link-Belt Engineering Co., Phila., Pa.
Morse, Williams & Co., Phila., Pa.
Penna. Elevator Engineering Co., Phila., Pa.**Emery and Emery Wheels.**N. Y. Belting & Packing Co., Ltd., N. Y.
Northampton Emery Wheel Co., Leeds, Mass.
Norton Emery Wheel Co., Worcester, Mass.
Sterling Emery Wheel Co., 174 Fulton St., N. Y.**Emery Wheel Dressers.**

Bay State Stamping Co., Worcester, Mass.

Engineers and Contractors.Aiken, Henry, Pittsburgh, Pa.
Artificial Gas Engineering Co., Pittsburgh, Pa.
Herrick, J. A., 284 Pearl St., N. Y.
Kennedy, Julian, Pittsburgh, Pa.
Laughlin, Alex. & Co., Pittsburgh, Pa.
Lean, D. K., Co., Pittsburgh, Pa.
McClure, Amel & Co., Pittsburgh, Pa.
Pittsburgh Iron & Steel Engineering Co., Pittsburgh, Pa.
Smythe, S. R. Co., Incorporated, Pittsburgh, Pa.
Swindell, W. & Bros., Pittsburgh, Pa.**Engines, Gas and Gasoline.**Buckeye Mfg. Co., Union City, Ind.
Otto Gas Engine Works, Phila., Pa.
Springfield Gas Engine Co., Springfield, Ohio.**Engines, Steam, Makers of.**Bass Foundry & Machine Works, Ft. Wayne, Ind.
Harris, Wm. A. Steam Engine Co., Providence, R. I.
Norwalk Iron Works Co., So. Norwalk, Conn.
Penna. Diamond Drill & Mfg. Co., Birdsboro, Pa.
Phila. Engineering Works, Phila., Pa.
Southwick Foundry & Machine Co., Phila., Pa.
Tod, William & Co., Youngstown, O.
Totten & Hogg Iron & Steel Fdry., Co., Pittsburgh, Pa.
Wetherill, Robt. & Co., Chester, Pa.**Exhaust Tumblers.**

Sweetser, W. A., Brockton, Mass.

Expansion Bolts.Boone, W. C. Mfg. Co., Boonton, N. J.
Church, Isaac, Toledo, O.
Steward & Romaine Mfg. Co., Phila., Pa.**Exporters.**

Flint & Co., 68 Broad St., N. Y.

Faucets, Self-Measuring.

Lane Bros., Poughkeepsie, N. Y.

Faucets, Wooden, Makers of.

John Sommer's Son, Newark, N. J.

Feed-Water Heaters and Purifiers.Davis, I. B. & Son, Hartford, Conn.
Harrison Safety Boiler Works, Phila., Pa.
National Pipe Bending Co., New Haven, Conn.
Taunton Locomotive Mfg. Co., Taunton, Mass.
Webster, Warren & Co., Camden, N. J.
Whitlock Coil Pipe Co., Elmwood, Conn.**Fencing, Iron and Wire.**Barnum, E. T., Detroit, Mich.
Champion Iron Co., Kenton, O.
Clinton Wire Cloth Co., Clinton, Mass.
Gilbert & Bennett Mfg. Co., 42 Cliff St.
Kilmer Mfg. Co., Newburgh, N. Y.
Randall Fence Co., Le Roy, N. Y.
The Van Dorn Iron Works Co., Cleveland, O.**Files, Importers of.**

Moss, F. W., 80 John St., N. Y.

Files and Rasps, Manufacturers of.Arcade File Works, Anderson, Ind.
Banker & White, Troy, N. Y.
Barnett, G. & H., 41 & 43 Richmond, Phila.
McCaffrey File Co., Philadelphia.
Nicholson File Co., Providence, R. I.**Fire Brick, Makers of.**Borgner, Cyrus, Philadelphia, Pa.
Garner, Jas. & Son, Cumberland, Md.
Kreischer, B. & Sons, Foot E. Houston St., N. Y.
Maurer, H. & Son, 420 E. 23d, N. Y.
Ostrander Fire Brick Co., Troy, N. Y.
Valentine, M. D. & Bro. Co., Woodbridge.**Fire Doors.**

Coburn Trolley Track Mfg. Co., Holyoke, Mass.

Fishing Tackle.

Dame, Stoddard & Kendall, Boston, Mass.

Flint and Emery Paper.

Baeder, Adamson & Co., Phila., Pa.

Flour Sifters.

Bromwell Brush & Wire Goods Co., Cincinnati, Ohio.

Fodder Cutters.

Silver Mfg. Co., Salem, O.

Forges, Portable, &c.Buffalo Forge Co., Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Sturtevant, B. F. Co., Boston, Mass.**Forgings, Iron and Steel.**Bethlehem Iron Co., S. Bethlehem, Pa.
Cambria Steel-Cambria Iron Co., Johnstown, Pa.
Frankford Steel Co., Phila., Pa.
Scranton Forging Co., Scranton, Pa.
U. S. Projectile Co., Brooklyn, N. Y.**Forks, Hay and Manure.**

Iowa Farming Tool Co., Ft. Madison, Iowa.

Foundry Facings.Dixon, Jos., Crucible Co., Jersey City, N. J.
S. Obermayer Co., Cincinnati, O.
Smith, J. D., Fdy. Supply Co., Cinnc., O.**Foundry Riddles.**

Estey, W. S., 65 Fulton, N. Y.

Foundry Supplies.Diamond Clamp & Flask Co., Richmond, Ind.
S. Obermayer Co., Cincinnati, O.
Rice Mfg. Co., New Durham, N. H.
Smith, J. D., Fdy. Supply Co., Cinnc., O.
Smith's Pattern Works, Akron, Ohio.**Friction Clutches.**Brown, A. & F., 17 Day St., N. Y.
Keystone Clutch & Mch. Wks., Phila., Pa.
Moore & White Co., Philadelphia, Pa.**Friction Cone.**

Evans Friction Cone Co., Boston, Mass.

Galvanized Material.Jersey City Galvanizing Co., 112 John St., N. Y.
Sands, Thos., Nashua, N. H.**Gas Producers.**

Wood, R. D. & Co., Philadelphia, Pa.

Gas & Steam Fitters' Supplies.

Pancoast, Henry B. & Co., Phila., Pa.

Gate Hinges.

Wrightsville Hdw. Co., Wrightsville, Pa.

Gear Cutters.

D. E. Whiton Mach. Co., New London, Conn.

Gears.Boston Gear Works, Boston, Mass.
Gleason Tool Co., Rochester, N. Y.
Lincoln Iron Works, Rutland, Vt.
Poole, Robt. & Son Co., Baltimore, Md.
U. S. Projectile Co., Brooklyn, N. Y.**Glass Boards.**

Lufkin Rule Co., Saginaw, Mich.

Glass Cutters.

Monce, S. G., Bristol, Conn.

Glue.Baeder, Adamson & Co., Phila., Pa.
Dodd, A. W. & Co., Gloucester, Mass.
Russia Cement Co., Gloucester, Mass.**Grass Catchers.**

Supplee Hardware Co., Phila., Pa.

Grinding and Polishing Machines.

Norton Emery Wheel Co., Worcester, Mass.

Grindstone Dressing Machinery.

Blake & Johnson, Waterbury, Conn.

Grindstones.

Cleveland Stove Co., Cleveland, O.

Gunpowder, Makers of.

Lafin & Rand Powder Co., 29 Murray St., N. Y.

Hammocks.

Eustis, Jas. W. Co., Boston, Mass.

Handles.

Cleveland Wood Turning Co., Cleveland, O.

Hangers, Door.Coburn Trolley Track Mfg. Co., Holyoke, Mass.
Lane Bros., Poughkeepsie, N. Y.**Hardware Comm'n Merchants.**Graham, John H. & Co., 111 Chambers St., New York.
Jacobus, W. H., 90 Chambers, N. Y.**Hardware Jobbers.**

White, Van Glahn & Co., 15-17 Chat-ham Square, N. Y.

Hardware Manufacturers.Stearns, E. C. & Co., Syracuse, N. Y.
Streeter, N. R. & Co., Groton, N. Y.
Union Mfg. Co., 103 Chambers, N. Y.
Yale & Towne Mfg. Co., Stamford, Conn.**Hardware Mfrs.' Agents.**Bingham, W. Co., Cleveland, O.
Clarke, Thomas, St. John, N. B.
Graham, John H. & Co., 113 Chambers, N. Y.
Sickles, Sweet & Lyon, 35 Barclay, N. Y.**Hardware Specialties.**Acme Shear Co., Bridgeport, Conn.
Berger Bros., Philadelphia, Pa.
Bourke Mfg. Co., Youngstown, O.
Enterprise Mfg. Co., Philadelphia, Pa.
Ette & Henger Mfg. Co., St. Louis, Mo.
Johnson, S. C., Racine, Wis.
New Britain Hdw. Mfg. Co., New Britain, Conn.North Bros. Mfg. Co., Philadelphia, Pa.
Ransom Hdw. Co., Burlington, Vt.
Scranton & Co., New Haven, Conn.
Shepard, Sidney & Co., Buffalo, N. Y.
Wilson, J. Fred., Worcester, Mass.
Wrightsville Hdw. Co., Wrightsville, Pa.**Harness Snaps.**Covert Mfg. Co., West Troy, N. Y.
Coverts' Saddlery Wks., Farmer, N. Y.
Fitch, W. & E. T., New Haven, Conn.**Hoisting Machines.**Box, Alfred & Co., 314 Green, Phila.
Brown Hoisting & Conveying Mch. Co., Cleveland, Ohio.
Fulton Iron & Engine Wks., Detroit, Mich.
Harrington, E. Son & Co., Phila.
Lane Bros., Poughkeepsie, N. Y.
Lidgerwood Mfg. Co., 96 Liberty, N. Y.
Lincoln Iron Works, Rutland, Vt.
McCoy, Jos. F. & Co., 26 Warren St.
Maris & Beekley, Philadelphia, Pa.
Morse Mfg. & Fdy. Co., Milwaukee, Wis.
Morse, Williams & Co., Phila.
Sellers, Wm. & Co., Phila. and N. Y.
Speldel, J. G., Reading, Pa.
Yale & Towne Mfg. Co., Stamford, Ct.**Hollow Ware.**Avery Stamping Co., Cleveland, O.
Bronson Supply Co., Cleveland, Ohio.
Cleveland Stamping & Tool Co., Cleveland, O.**Hollow Ware, Aluminum.**

Wohler Aluminum Co., Chicago, Ill.

Horse Nails, Makers of.Capewell Horse Nail Co., Hartford, Conn.
National Horse Nail Co., Vergennes, Vt.
Putnam Nail Co., Neponset, Boston, Mass.**Horse and Mule Shoes, Makers of.**Bryden Horse Shoe Co., Catsasauqua, Pa.
Burden Iron Co., Troy, N. Y.
Crescent Horse Shoe & Iron Co., Max Meadows, Va.
Diamond State Iron Co., Wilmington, Del.
Old Dominion Iron & Nail Works Co., Old Dominion, Va.
Phoenix Horse Shoe Co., Poughkeepsie, N. Y.
Rhode Island Perkins Horse Shoe Co., Providence.
Shoenberger & Co., Pittsburgh, Pa.
Standard Horse Shoe Co., Boston, Mass.**Hose Menders.**

Hudson, C. E. & Co., Leominster, Mass.

Hose.

N. Y. Belting & Packing Co., Ltd., 15 Park Row, N. Y.

Hydrants, &c.

McLean, John, 206 & 208 Monroe, N. Y.

Hydraulic Forging.

U. S. Projectile Co., Brooklyn, N. Y.

Hydraulic Jacks.Dudgeon, Richard, 24 Columbia, N. Y.
McCoy, Jos. F. Co., 26 Warren St., N. Y.**Ice Cream Freezers.**North Bros. Mfg. Co., Phila., Pa.
Packer, C. W., Philadelphia, Pa.
White Mountain Freezer Co., Nashua, N. H.**Injectors.**Egnon-Evans Mfg. Co., Philadelphia, Pa.
Jenkins Bros., New York.**Insurance, Boiler.**

Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

Iron and Steel, Swedish.Lundberg, Gustaf, Sweden, Mass.
Milne, A. & Co., 1 Broadway, N. Y.**Iron Commission Brokers.**Butze, Adolph, St. Louis, Mo.
Corning, Edw. & Co., 29 B'way, N. Y.
Cotton, Barclay W. & Co., Phila.
Etting, Edw. J., Philadelphia.
Hogan, John L. & Co., Philadelphia, Pa.
Hoffman, J. W. & Co., Philadelphia.
Levis, Henry & Co., Philadelphia.
Keeley, Jerome & Co., Philadelphia.
Lea, J. Tatnall & Co., Philadelphia.
Mohr, J. J., 430 Walnut, Philadelphia.
Pilling & Crane, Philadelphia, Pa.
Wister, L. & R. & Co., Phila., Pa.**Iron Ore.**

Samuel, Frank, Philadelphia, Pa.

Iron, Merchants.Barns, C. K. & Co., Philadelphia, Pa.
Borden & Lovell, 70 West, N. Y.
Bussentius & Cunliffe, Philadelphia.
Corning, Edw. & Co., 29 B'way, N. Y.
Cox, Justice, Jr., Philadelphia.
Cotton, Barclay W. & Co., Phila.
Hoffman, J. W. & Co., Philadelphia.
Leonard, J., 440 West St., N. Y.
Nicolls, Wheeler & Co., Philadelphia.
Ogden & Wallace, 577 to 583 Greenwich St., N. Y.
Pierson & Co., 29 Broadway, N. Y.
Thomson, W. H. & Co., Phila., Pa.
Wallace, Wm. H. & Co., 66 B'way, N. Y.
Whitney, A. R. & Co., 17 B'way, N. Y.
Wilson, E. H. & Co., Philadelphia.**Iron, Importers.**Abbott, Wheelock & Co., N. Y. and Boston.
Lundberg, Gustaf, Boston, Mass.**Iron Sheet, Manufacturers of.**Cambridge Iron & Steel Co., Cambridge, Ohio.
W. Dewees Wood Co., Lim., McKeesport, Pa.**Ironwork, Ornamental.**Barnum, E. T., Detroit, Mich.
Champion Iron Co., Kenton, O.
Ludlow-Saylor Wire Co., St. Louis, Mo.
The Van Dorn Iron Works Co., Cleveland, O.**Juice Extractors.**

Sterling Aluminum Co., Brooklyn, N. Y.

Keys.

Wollensak, J. F., Chicago, Ill.

Knife and Tool Grinders.

Tracy, A. J. Co., Ltd., 18 Cliff St., N. Y.

Ladles.

Whiting Fdy. Equipment Co., Chicago, Ill.

Lanterns.Rochester Lamp Co., 42 Park Place, New York.
Steam Gauge & Lantern Co., Syracuse, N. Y.**Lathes.**Dietz, Schumacher & Co., Cincinnati, O.
Draper Machine Tool Co., Worcester, Mass.
Harrington, E. Son & Co., Phila., Pa.
Johnson, Israel H., Jr., & Co., Philadelphia, Pa.
New Haven Mfg. Co., New Haven, Conn.
Sebastian Lathe Co., Cincinnati, O.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.**Lathing, Expanded Metal.**

Chess Bros., Pittsburgh, Pa.

Lathing, Wire.Clinton Wire Cloth Co., Clinton, Mass.
N. J. Wire Cloth Co., Trenton, N. J.
Wright & Colton Wire Cloth Co., Worcester, Mass.**Lawn Mowers.**Blair Mfg. Co., Springfield, Mass.
Chadborn & Coldwell Mfg. Co., Newburg, N. Y.
Coldwell Lawn Mower Co., Newburg, N. Y.
Dille & McGuire Mfg. Co., Richmond, Ind.
Enterprise Mfg. Co., Philadelphia, Pa.
F. & N. Mfg. Co., Richmond, Ind.
Henley, M. C., Richmond, Ind.
Supplee Hdw. Co., Phila., Pa.**Lawn Rakes.**Gibbs Mfg. Co., Canton, Ohio.
Kohler, F. E. & Co., Canton, O.**Lawn Sprinklers.**Blair Mfg. Co., Springfield, Mass.
Enterprise Mfg. Co., Phila., Pa.
Ette & Henger Mfg. Co., St. Louis, Mo.
Graham, John H. & Co., 113 Chambers Street, N. Y.
McGowan, John H. Co., Cincinnati, O.
Portland Lawn Sprinkler Co., Portland, Me.**Letters and Figures, Metallic.**

White, A. A. & Co., Providence, R. I.

Letters, Paper.

Tablet & Ticket Co., Chicago, Ill.

Levels.

Richardson, C. F. & Son, Athol, Mass.

Locks and Knobs, Manufacturers of.Deitz, A. E., 97 Chambers, N. Y.
Independent Electric Co., Chicago, Ill.
Reading Hdw. Co., Reading, Pa.
Smith & Egge Mfg. Co., Bridgeport, Conn.
Yale & Towne Mfg. Co., Stamford, Conn.**Lubricants.**

Dixon, Jos., Crucible Co., Jersey City, N. J.

Machinery.Am. Tool Works, Cleveland, Ohio.
Ayer, H. C. & Gleason Co., Phila., Pa.
Barnes, W. F. & John, Rockford, Ill.
Bement, Miles & Co., Philadelphia, Pa.
Bigelow, C. E., 45 Dey, N. Y.
Bignall & Keeler Mfg. Co., St. Louis.
Bliss, E. W. Co., Brooklyn, N. Y.
Bridgeport Mch. Tool Works, Bridgeport, Conn.
Briggs, Marvin, 12 Broadway, N. Y.
Carlin's Sons, Thos., Allegheny, Pa.
Clapp, Geo. M., agt., 74 Cortlandt, N. Y.
Dietz & Harvey Mch. Co., Baltimore, Md.
Dietz, Schumacher & Co., Cincinnati, Ohio.
Fitchburg Mch. Works, Fitchburg, Mass.
Garvin Mch. Co., Laight & Canal Sts.
Gould & Eberhardt, Newark, N. J.
Hamilton Mch. Tool Co., Hamilton, O.
Harrington, E. Son & Co., Phila., Pa.
Henderer, A. L., Wilmington, Del.
Hendy Machine Co., Torrington, Ct.
Hill, Clarke & Co., Boston, Mass.
Howard & Morse, 45 Fulton St., N. Y.
Hulbut-Rogers Mch. Co., South Sudbury, Mass.
Johnson, Israel H., Jr., & Co., Phila.
Jones & Lamson Mch. Co., Springfield, Vt.
Lodge & Davis Mch. Tool Co., Cincinnati, O.
Lodge & Shipley Mch. Tool Co., Cincinnati, O.
Lovegrove & Co., Philadelphia, Pa.
McCabe, J. J., 68 Cortlandt, N. Y.
Machinists' Supply Co., Rochester, N. Y.
Manville, E. J., Mch. Co., Waterbury, Conn.
Newark Mch. Tool Wks., Newark, N. J.
New Haven Mfg. Co., New Haven, Ct.
New York Machinery Depot, 178 Broadway, New York.
Niles Tool Wks., 138 Liberty St., N. Y.
Pittsburgh Mfg. Co., Pittsburgh, Pa.

- Place, Geo., 145 Broadway, N. Y.
 Poole, Robt. & Son Co., Baltimore, Md.
 Powell Planer Co., Worcester, Mass.
 Prentiss Tool & Supply Co., N. Y.
 Scranton Supply & Mchry. Co., Scranton, Pa.
 Sellers, Wm. & Co., Phila.
 Seyfert's Sons, L. F., Philadelphia, Pa.
 Sigourney Tool Co., Hartford, Conn.
 Steptoe, J. & Co., Cincinnati, O.
 Stow Flexible Shaft Co., Ltd., Phila.
 Toomey, Frank, Philadelphia, Pa.
 Walker Mfg. Co., Cleveland, O.
 Wetherill, Robert & Co., Chester, Pa.
 Wilson, W. A., Rochester, N. Y.
- Machinery for Hardware Manufacturers.**
 Adt. Jno. & Son, New Haven, Conn.
- Machine Knives.**
 Loring, Coes & Co., Worcester, Mass.
 Simonds Mfg. Co., Fitchburg, Mass.
 New Britain Hdw. Mfg. Co., New Britain, Conn.
- Machine Screws.**
 New Britain Hdw. Mfg. Co., New Britain, Conn.
- Machine Tools.—See Machinery.**
- Machine Work.**
 Papping, J., 58th St. & 11th Ave., N. Y. City.
- Machinists' Scales**
 Coffin & Leighton, Syracuse, N. Y.
 Starrett, L. S., Athol, Mass.
- Machinists' Tools and Supplies.**
 King, J. M. & Co., Waterford, N. Y.
 Sellers, Wm. & Co., Inc., Phila.
- Manufacturing Sites.**
 Harmon, T. H., Lock Haven, Pa.
- Measuring Tapes.**
 Keuffel & Esser Co., N. Y.
 Lufkin Rule Co., Saginaw, Mich.
- Meat Choppers.**
 Clauss Shear Co., Fremont, Ohio.
- Mechanical Instruction.**
 Correspondence School of Mechanics, Scranton, Pa.
- Metals.**
 Fearing, Wm. S., 100 Chambers, N. Y.
 Hendricks Bros., 49 Cliff, N. Y.
- Metal Brokers.**
 American Metal Co., N. Y.
- Metallurgists.**
 Britton, J. Blodgett, Phila., Pa.
- Mincing Knives.**
 Palmer Hdw. Mfg. Co., Troy, N. Y.
- Mine Lamps.**
 Darby, Edw. & Sons, Phila., Pa.
 Leonard, B. E., Scranton, Pa.
- Mining Screens.**
 Harrington & King Perforating Co., Chicago, Ill.
 Howard & Morse, 45 Fulton, N. Y.
- Models, Makers of.**
 Franklin, H. H. Mfg. Co., Syracuse, N. Y.
 Ideal Machine Works, Hartford, Conn.
- Molding Sand.**
 Obermayer, S. Co., Cincinnati, O.
- Money Drawers.**
 Columbian Novelty Co., North East, Penna.
- Motors, Water and Electric.**
 Bolgiano Mfg. Co., Baltimore, Md.
 C. & C. Electric Co., 402 and 404 Greenwich St., N. Y.
 Dallett, Thomas H. & Co., Phila., Pa.
- Nail Machinery.**
 Pittsburgh Mfg. Co., Pittsburgh, Pa.
- Nail and Tack Pullers.**
 Scranton & Co., New Haven, Conn.
 Specialty Mfg. Co., Hartford, Conn.
- Nails (Cut) and Spikes.**
 Borden & Lovell, 70 West, N. Y.
 Pottstown Iron Co., Pottstown, Pa.
 Riverside Iron Wks., Wheeling, W. Va.
- Nickel Plating.**
 Rhodes, L. E. Co., Hartford, Conn.
- Norway Shapes, Rollers of.**
 Rowland, William & Harvey, Frankford, Philadelphia.
- Novelty Manufacturers.**
 Franklin, H. H. Mfg. Co., Syracuse, N. Y.
 Ideal Machine Works, Hartford, Conn.
- Nut Machines.**
 Dunham Nut Co., Unionville, Ct.
- Nuts, Bolts, &c., Makers of.**
 American Bolt Co., Lowell, Mass.
 American Screw Co., Providence, R. I.
 Blake & Johnson, Waterbury, Conn.
 Dunham Nut Co., Unionville, Conn.
 Haskell, Wm. H. Co., Pawtucket, R. I.
 Mt. Carmel Bolt Co., Mt. Carmel, Conn.
 Pennsylvania Bolt & Nut Co., Lebanon, Pa.
 Port Chester Bolt & Nut Co., Port Chester, N. Y.
 Russell, Burdall & Ward, Port Chester, N. Y.
 Sternbergh, J. H. & Son, Reading, Pa.
 Wilson, J. Fred., Worcester, Mass.
 Wm. H. Haskell Co., Pawtucket, R. I.
- Oilers.**
 Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
- Oil Stones.**
 Pike Mfg. Co., Pike Station N. H.
- Ores.**
 Wister, Francis, Philadelphia, Pa.
- Ox Shoes.**
 Scranton Forging Co., Scranton, Pa.
- Packing**
 Morrison, Robert, St. Louis, Mo.
 N. Y. Belting & Packing Co., Ltd., N. Y.
- Paddocks.**
 Ames Sword Co., Chicopee, Mass.
 Fraim, E. T., Lancaster, Pa.
 Independent Electric Co., Chicago, Ill.
 Wolf, W. & L., Phila., Pa.
- Paint Burners.**
 Dangler Stove & Mfg. Co., Cleveland, Ohio.
- Paint Cans.**
 Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
- Pants Stretcher.**
 Covert Mfg. Co., West Troy, N. Y.
- Patent Solicitors.**
 Butler, C. N., Phila., Pa.
 Jenner, H. W. T., Washington, D. C.
 Howson & Howson, Philadelphia and Washington.
 Stocking, E. B., Washington, D. C.
- Pattern Letters.**
 Wells, Heber, 157 William St., N. Y.
- Perforated Metal.**
 Clinton Wire Cloth Co., Clinton, Mass.
 Harrington & King Perforating Co., Chicago, Ill.
 Hendrick Mfg. Co., Ltd., Carbondale, Pa.
- Phosphor Bronze.**
 Phosphor Bronze Smelting Co., Limited, Philadelphia.
- Phosphor Tin.**
 Crescent Phosphorized Metal Co., Philadelphia, Pa.
 Halk & Naumann, 516 Pearl, N. Y.
- Picks and Mattocks.**
 Plumb, Fayette R., Philadelphia, Pa.
- Pix Iron.**
 Houston, C. B. & Co., Philadelphia, Pa.
 Montour Iron & Steel Co., Danville, Pa.
 Naylor & Co., 45 Wall, N. Y.
 Pilling & Crane, Philadelphia, Pa.
 Samuel, Frank, Philadelphia, Pa.
- Pig Iron Storage.**
 Am. Pig Iron Storage Warrant Co., 44 Wall, N. Y.
- Pile Drivers.**
 Vulcan Iron Works, Chicago, Ill.
- Pipe, Bent.**
 National Pipe Bending Co., New Haven, Conn.
- Pipe Cutting and Threading Machines.**
 Armstrong Mfg. Co., Bridgeport, Conn.
 Bignall & Keeler Mfg. Co., St. Louis, Mo.
 Detrick & Harvey Mch. Co., Baltimore, Md.
 Merrill Mfg. Co., Toledo, O.
 Pancoast, Henry B. & Co., Phila.
 Saunders' Sons, D., Yonkers, N. Y.
 Walworth Mfg. Co., Boston, Mass.
- Pipe Grips.**
 Prentiss Vise Co., 44 Barclay, N. Y.
- Pipes, Fittings, &c., Makers of.**
 McNab & Harlin Mfg. Co., N. Y.
- Pipe, Water and Gas, Makers of.**
 Donaldson Iron Co., Emaus, Pa.
 Riverside Iron Works, Wheeling, W. Va.
 Wood, R. D. & Co., Philadelphia, Pa.
- Plane Irons, Manufacturers of.**
 Buck Bros., Millbury, Mass.
 Buck, Chas., Millbury, Mass.
- Planers.**
 Detrick & Harvey Mch. Co., Baltimore, Md.
 New Haven Mfg. Co., New Haven, Conn.
 Powell Planer Co., Worcester, Mass.
 Wilson, W. A., Worcester, Mass.
- Planes, Manufacturers of.**
 Stanley Rule & Level Co., N. Y.
- Plated Ware.**
 Boardman, L. & Son, New Haddam, Ct.
 Holmes & Edwards Silver Co., Bridgeport, Conn.
 Rogers, Wm. Mfg. Co., Hartford, Ct.
- Plate, Iron and Steel, Mfrs. of.**
 Aetna-Standard Iron & Steel Co., Bridgeport, O.
 Chess Bros., Pittsburgh, Pa.
 Lukens Iron & Steel Co., Coatesville, Pa.
 Mahoning Valley Iron Co., Youngstown, Ohio.
 Moorhead-McLean Co., Pittsburgh, Pa.
 McIlvain & Sons, Reading, Pa.
 Pottstown Iron Co., Pottstown, Pa.
 Pottsville Iron & Steel Co., Pottsville, Pa.
 Singer, Nimick & Co., Pittsburgh, Pa.
 The Mahoning Valley Iron Co., Youngstown, O.
 Wood, Alan Co., Philadelphia.
- Plating, Nickel, Brass and Silver.**
 Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
- Polishing Machines.**
 Watson & Stillman, 204 E. 43d, N. Y.
- Post Hole Diggers.**
 Gibbs Mfg. Co., Canton, Ohio.
 Kohler, F. E. & Co., Canton, O.
- Poultry Nettings.**
 Barnum, E. T., Detroit, Mich.
 Gilbert & Bennett Mfg. Co., 42 Cliff St., N. Y.
 N. J. Wire Cloth Co., Trenton, N. J., "Silver Finish."
 Tyler Wire Works Co., W. S., Cleveland, O.
 Wright & Colton Wire Cloth Co., Worcester, Mass.
- Powder.**
 Ladin & Rand Powder Co., 29 Murray, New York Powder Co., 62 Liberty St., N. Y.
- Power Hack Saws.**
 Millers Falls Co., 93 Reade St., N. Y.
- Power Hammers.**
 Dienelt & Elsenhardt, Philadelphia.
 Dupont Mfg. Co., St. Johnsbury, Vt.
 Jenkins & Linsie, Bellefonte, Pa.
 Long & Allstatter Co., Hamilton, Ohio.
 Miner & Peck Mfg. Co., New Haven Conn.
 Scranton & Co., New Haven, Conn.
- Power Transmitting Machinery.**
 Dodge Mfg. Co., Mishawaka, Ind.
- Presses, Dies, &c.**
 E. W. Bliss Co., Brooklyn, N. Y.
 Crosby, G. A. & Co., Chicago, Ill.
 Stark Mch. & Tool Co., Buffalo, N. Y.
 Styles & Parker Press Co., Brooklyn, N. Y.
 Waterbury Mch. Co., Waterbury Ct.
- Presses, Power, Makers of.**
 Bliss, E. W. Co., Brooklyn, N. Y.
 Manville, E. J. Mch. Co., Waterbury, Ct.
 Merriman, A. H., Meriden, Conn.
 Stark Mch. & Tool Co., Buffalo, N. Y.
 Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
- Printers.**
 Griffith, Axtell & Cady Co., Holyoke, Mass.
- Pruning Knives.**
 Gibbs Mfg. Co., Canton, O.
- Pulleys.**
 Brown, A. & F., 17 Day St., N. Y.
 Dodge Mfg. Co., Mishawaka, Ind.
 Keystone Clutch Mch. Wks., Phila., Pa.
- Pulverizing Mills.**
 Bradley Fertilizer Co., Boston, Mass.
- Pumping Machinery.**
 Dean Bros. Steam Pump Works, Indianapolis, Ind.
 Goulds Mfg. Co., Seneca Falls, N. Y.
 Hooker-Corville Steam Pump Co., St. Louis, Mo.
 McGowan, J. H. & Co., Cincinnati, O.
 Maslin, J. & Son, Jersey City, N. J.
 Norwalk Iron Works Co., So. Norwalk Conn.
 Southwark Fdy. & Mch. Co., Phila., Pa.
 Valley Pump Works, Easthampton, Mass.
 Worthington, Henry R., 86 and 88 Liberty St., N. Y.
- Pumps, Makers of.**
 Bellows Pump Co., Bellevue, Iowa.
 Deming Co., Salem, O.
 Douglas, W. & B., Middletown, Conn.
 Goulds Mfg. Co., Seneca Falls, N. Y.
 Myers, F. E. & Bro., Ashland, O.
- Punches.**
 Richards, I. P., Providence, R. I.
- Punches and Shears, Hand and Power.**
 E. W. Bliss Co., Brooklyn, N. Y.
 Crosby, G. A. & Co., Chicago, Ill.
 Henderer, A. L., Wilmington, Del.
 Long & Allstatter Co., Hamilton, Ohio.
 Stark Mch. & Tool Co., Buffalo, N. Y.
 Styles & Parker Press Co., Brooklyn, N. Y.
 Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
 Watson & Stillman, 204 E. 43d, N. Y.
- Rails, Old and New.**
 Perry, W. H. & Co., Providence, R. I.
- Rat and Mouse Traps.**
 Estey, W. S., 65 Fulton, N. Y.
- Razor Guard.**
 Murphy, P. D., Lockport, N. Y.
- Razor Sharpener.**
 Dams, Stoddard & Kendall, Boston, Mass.
- Razors, Manufacturers of.**
 Torrey, J. R. Razor Co., Worcester, Mass.
- Reels.**
 Hendryx, A. B. Co., New Haven, Conn.
- Refrigerator Door Fasteners.**
 Conroy, F. J. & Co., Philadelphia.
- Rivets.**
 Blake & Johnson, Waterbury, Conn.
 Boyce Rivet Co., Muncie, Ind.
 Burden Iron Co., Troy, N. Y.
 Clark & Lowies, Plainville, Conn.
 Cobb & Drexel, Plymouth, Mass.
 Sternbergh, J. H. & Son, Reading, Pa.
 Townsend, W. P. & Co., New Brighton, Pa.
- Riveting Machines.**
 Adt. Jno. & Sons, New Haven, Conn.
- Rolling Mill Machinery.**
 Birmingham Iron Fdry, Birmingham, Conn.
 Booth, The Lloyd Co., Youngstown, O.
 Leachburg Foundry & Mch. Co., Pittsburgh, Pa.
 Morgan Construction Co., Worcester, Mass.
 Robinson-Rea Mfg. Co., Pittsburgh.
 Totten & Hogg Iron and Steel Fdry. Co., Pittsburgh, Pa.
 Trethewey Mfg. Co., Pittsburgh, Pa.
 Waterbury Farrel Foundry & Mch. Co., Waterbury Conn.
- Rolls, Chilled, Sand and Steel.**
 Birmingham Iron Foundry, Birmingham, Conn.
 Booth, The Lloyd Co., Youngstown, O.
 East Chicago Fdry Co., Chicago, Ill.
 Garrison, A. Fdry. Co., Pittsburgh, Pa.
 Robinson-Rea Mfg. Co., Pittsburgh, Pa.
 Seaman, Sitch & Black, Pittsburgh.
 Totten & Hogg Iron and Steel Fdry. Co., Pittsburgh, Pa.
- Roofing.**
 Cambridge Roofing Co., Cambridge, O.
 Cincinnati Corrugating Co., Fiqua, O.
 Kanneberg Roofing Co., Canton, O.
 N. Y. Iron Roofing & Corrugating Co., Jersey City, N. J.
- Rope and Web Goods.**
 Covert Mfg. Co., West Troy, N. Y.
 Covert's Saddlery Wks., Farmer, N. Y.
- Rope Wheels.**
 Cresson, Geo. V. Co., Philadelphia, Pa.
- Rubber Goods.**
 Canfield, H. O., Bridgeport, Conn.
- Rules, Manufacturers of.**
 Keuffel & Esser Co., New York.
 Lufkin Rule Co., Saginaw, Mich.
 Stanley Rule & Level Co., 29 Chambers.
- Rust Preventive.**
 Bridgeport Gun Implement Co., 318-345 Broadway, N. Y.
- Sad Irons.**
 Streeter, N. R. & Co., Groton, N. Y.
- Sad Irons, Gas.**
 Bolgiano Mfg. Co., Baltimore, Md.
- Sand Paper.**
 Baeder, Adamson & Co., Phila., Pa.
- Sash Balances.**
 Caldwell Mfg. Co., Rochester, N. Y.
 Pullman Sash Balance Co., Rochester, N. Y.
- Sash Cords and Chains.**
 Morton, Thos., 45 Elizabeth, N. Y.
 Ossavan Mills Co., Norwich, Conn.
 Samson Cordage Works, Boston, Mass.
 Smith & Egge Mfg. Co., Bridgeport.
- Sash Locks.**
 Champion Safety Lock Co., Cleveland, Ohio.
- Sash Pulleys.**
 Palmer Hardware Mfg. Co., Troy, N. Y.
- Sash Weights.**
 Brown, E. E. & Co., Philadelphia, Pa.
 Norton Bros., Chicago, Ill.
- Saw Filing Machines.**
 Diston, Henry & Sons, Philadelphia, Pa.
- Saws, Makers of.**
 Diston, Henry & Sons, Phila., Pa.
 National Saw Co., 96 Reade St., N. Y.
 Simonds Mfg. Co., Fitchburg, Mass.
- Saw Vises.**
 Seneca Falls Mfg. Co., Seneca Falls, N. Y.
- Saw Sets.**
 Taintor Mfg. Co., 84-86 Chambers, N. Y.
- Scales, Manufacturers of.**
 Buffalo Scale Co., Buffalo, N. Y.
 Chatillon, John & Sons, 85-89 Cliff, N. Y.
- Scrapers, Road.**
 Am. Steel Scraper Co., Sydney, Ohio.
 Sidney Steel Scraper Co., Sidney, O.
- Screens, Coal and Ore.**
 Hendrick Mfg. Co., Ltd., Carbondale Pa.
- Screw Cutting Machinery.**
 Wells Bros. & Co., Greenfield, Mass.
 Wiley & Russell Mfg. Co., Greenfield, Mass.
- Screw Drivers.**
 Brown, R. H. & Co., New Haven, Conn.
 Mayhew, H. H. Co., Shelburne Falls, Mass.
- Screw Plate and Pipe Cutter.**
 Jarecki Mfg. Co., Erie, Pa.
- Screws, Makers of.**
 American Screw Co., Providence, R. I.
 Blake & Johnson, Waterbury, Conn.
 Wm. H. Haskell Co., Pawtucket.
 Miles, F. S., 205 Quarry, Philadelphia.
 Reynolds & Co., New Haven, Conn.
 Worcester Machine Screw Co., Worcester, Mass.
- Scroll Saws.**
 Barnes, W. F. & John, Rockford, Ill.
 Seneca Falls Mfg. Co., Seneca Falls, N. Y.
- Scythe Stones and Whetstones.**
 Pike Mfg. Co., Pike Stat'n, N. H.
 Cleveland Stone Co., Cleveland, O.
- Shaft Coupling.**
 Columbian Novelty Co., North East, Penna.
- Shafting, Makers of.**
 Brown, A. & F., 17 Day St., N. Y.
 Cresson, Geo. V. Co., Philadelphia, Pa.
 Fairmount Mch. Co., Philadelphia, Pa.
 Sellers, Wm. & Co., Inc., Phila., Pa.
 Stow Mfg. Co., Binghamton, N. Y.
- Shaft Support.**
 Decatur Shaft Support Co., Decatur, Ill.
- Shaped Iron and Steel, Manufacturers of.**
 Aetna-Standard Iron & Steel Co., Bridgeport, O.
 East Chicago Fdry Co., Chicago, Ill.

- Allentown Rolling Mill, Allentown, Pa.**
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Passaic Rolling Mill Co., Paterson, N.J.
Pottsville Iron & Steel Co., Pottsville, Pa.
Roberts, A. & P. & Co., Phila., Pa.
The Phoenix Iron Co., Phila., Pa.
Tudor Iron Works, St. Louis, Mo.
- Shears and Scissors.**
Acme Shear Co., Bridgeport, Conn.
Reinischs, R. Sons Co., Newark, N. J.
- Sheet Iron and Steel, Manufacturers of.**
Aetna-Standard Iron and Steel Co., Bridgeport, O.
Cambridge Iron & Steel Co., Cambridge, Ohio.
Jersey City Galvanizing Co., 112 John St., N. Y.
Mahoning Valley Iron Co., Livingston, Ohio.
Morehead-McCleane Co., Pittsburgh.
Pierison & Co., 29 Broadway, N. Y.
Singer, Nimick & Co., Ltd., Pittsburgh, Pa.
The Mahoning Valley Iron Co., Youngstown, O.
Alan Wood Co., Philadelphia.
W. Dewees Wood Co., McKeesport, Pa.
- Sheet Zinc.**
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
- Show Cases.**
Union Show Case Co., Chicago, Ill.
- Sinks.**
Douglas, W. & B., Middletown, Conn.
- Skates, Ice.**
Keene Mfg. Co., Keene, N. H.
Winslow, Sam'l, Skate Mfg. Co., Worcester, Mass.
- Skates, Roller.**
Henley, M. C., Richmond, Ind.
Winslow, Sam'l, Skate Mfg. Co., Worcester, Mass.
- Slag Machines.**
Cambria Iron Co., Johnstown, Pa.
- Smelting Works.**
Reeves, Paul S., 760 S. Broad, Phila.
- Soldering Coppers.**
Clendenin Bros., Baltimore, Md.
Covert Mfg. Co., West Troy, N. Y.
- Speaking Tubes.**
Ostrander, W. R. & Co., 204 Fulton St. N. Y.
Wollensak, J. F., Chicago, Ill.
- Spelter.**
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
Missouri Metal Co., St. Louis, Mo.
- Spoons and Forks.**
Boardman, L. & Son, New Haddam, Conn.
Holmes & Edwards Silver Co., Bridgeport, Conn.
Rogers, The Wm. Mfg. Co., Hartford, Conn.
- Sporting Goods.**
Hartley & Graham, 318-315 B'way, N. Y.
- Springs.**
Clark & Cowles, Plainville, Ct.
Colled Wire Belting Co., Jersey City, N. J.
Dunbar Bros., Bristol, Conn.
Miller & Van Winkle, Brooklyn, N. Y.
Morgan Spring Co., Worcester, Mass.
Roland, Wm. & Harvey, Phila., Pa.
Sabin Machine Co., Montpelier, Vt.
Tuck Mfg. Co., Brockton, Mass.
Washburn & Moen Mfg. Co., Worcester, Mass.
Wolff, R. H. & Co., Ltd., 118th St. and Harlem River, N. Y.
- Spring Hinges.**
Bommer Bros., Brooklyn, N. Y.
Fullman Sash Balance Co., Rochester, N. Y.
Stover Mfg. Co., Freeport, Ill.
Van Wagoner & Williams Edw. Co., 14 Warren St., N. Y.
- Stamping Works.**
Avery Stamping Co., Cleveland, O.
Cleveland Stamping & Tool Co., Cleveland, O.
- Staples.**
Cobb & Drew, Plymouth, Mass.
Titchener, E. H. & Co., Binghamton, N. Y.
- Steam Gauges.**
Bristol Co., Waterbury, Conn.
- Steam Hammers, &c., Makers of.**
Dienelt & Eisenhardt, Philadelphia.
Dudgeon, Richard, 24 Columbia Street, N. Y.
Tretlowey Mfg. Co., Pittsburgh, Pa.
- Steam Heating & Oil Separators.**
Webster, Warren & Co., Camden, N. J.
- Steam Separators.**
Harrison Safety Boiler Wks., Phila., Pa.
Webster, Warren & Co., Camden, N. J.
- Steam Specialties.**
Lunkenheimer Co., Cincinnati, O.
- Steel, Cold Rolled Strip.**
Superior Steel Co., Pittsburgh, Pa.
Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
- Steel Figures and Alphabet.**
Krogsrud, W., 61 Fulton St., N. Y.
- Steel Importers.**
Abbott, Wheelock & Co., N. Y. and Boston.
Hobson, Francis, Seaman & Co., 97 John St., N. Y.
Jessop, Wm. & Sons, Sheffield, England, or 91 John, N. Y.
Milne, A. & Co., 1 Broadway, N. Y.
Newton & Shipman, 83 John, N. Y.
Wetherell Bros., 93 Liberty St., N. Y.
Whitney, A. R. & Co., B'dway, N. Y.
Wolff, R. H. & Co., Ltd., 118th Street and Harlem River, N. Y.
- Steel (Mushet's Special).**
Jones, B. M. & Co., Boston.
- Steel Manufacturers.**
Aetna-Standard Iron & Steel Co., Bridgeport, O.
Bethlehem Iron Co., S. Bethlehem, Pa.
Baker, Hermann & Co., 103 Duane St.
Carbon Steel Co., Pittsburgh, Pa.
Chester Steel Castings Co., Phila., Pa.
Chrome Steel Works, Brooklyn, N. Y.
Crescent Steel Co., Pittsburgh, Pa.
Frankford Steel Co., Philadelphia.
Gautier Steel Department of Cambria Iron Co., Johnstown, Pa.
Hobson, Francis, Seaman & Co., 97 John St., N. Y.
Jessop, Wm. & Sons, Sheffield, England, or 91 John, N. Y.
Keyser, Ellison & Co., Sheffield, Eng.
La Belle Steel Co., Pittsburgh, Pa.
Lukens Iron & Steel Co., Coatesville, Pa.
Moorhead-McCleane Co., Pittsburgh, Pa.
Moss, F. W., 83 John, N. Y.
Pottsville Iron and Steel Co., Pottsville, Pa.
Bowland, Wm. & Harvey, Frankford, Philadelphia.
Singer, Nimick & Co., Pittsburgh.
Superior Steel Co., Pittsburgh, Pa.
Wordlaw, S. & C., Sheffield, Eng.
Wetherell Bros., 93 Liberty, N. Y.
Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
- Steel, Manufacturers' Agents.**
Farns, C. K. & Co., Philadelphia, Pa.
Butze, Adolph, St. Louis, Mo.
Corning, Edw. & Co., 29 B'way, N. Y.
Lindsay, Jas. G. & Co., Phila., Pa.
Pierison & Co., 29 Broadway, N. Y.
- Steel Rails, Manufacturers of.**
Bethlehem Iron Co., S. Bethlehem, Pa.
Cambria Iron Co., Johnstown, Pa.
Montour Iron & Steel Co., Danville, Pa.
Riverside Iron Wks., Wheeling, W. Va.
- Steel, Tool.**
Frankford Steel Co., Philadelphia, Pa.
Jessop, Wm. & Sons, Sheffield, England, 91 John, N. Y.
Jones, B. M. & Co., Boston, Mass.
La Belle Steel Co., Pittsburgh, Pa.
- Step Ladders, Rolling.**
Bicycle Step Ladder Co., Chicago, Ill.
Coburn Trolley Track Mfg. Co., Holyoke, Mass.
Croissant, M., Albany, N. Y.
Morley Bros., Saginaw, Mich.
- Stocks and Dies.**
Armstrong Mfg. Co., Bridgeport, Conn.
Billings & Spencer Co., Hartford, Conn.
Butterfield & Co., Derby Line, Vt.
Hart Mfg. Co., Cleveland, O.
Oster Mfg. Co., Cleveland, O.
Saunders' Sons, D., Yonkers, N. Y.
Wells Bros. & Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.
- Stone Saws and Planers.**
Lincoln Iron Works, Rutland, Vt.
- Stove Linings.**
Ostrander Fire Brick Co., Troy, N. Y.
- Stove Pipe Thimbles.**
Cheney, S. & Son, Manlius, N. Y.
- Street Lamps.**
Rochester Lamp Co., 42 Park Place, New York.
Steam Gauge & Lantern Co., Syracuse, N. Y.
- Structural Iron Work.**
Lindsay, Jas. G. & Co., Phila., Pa.
- Sulphuric Acid.**
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
- Tacks, Brads, Staples, &c.**
Atlas Tack Corporation, Boston, Mass.
Chess Bros., Pittsburgh, Pa.
Clendenin Bros., Baltimore, Md.
Cobb & Drew, Plymouth, Mass.
Grand Crossing Tack Co., Grand Crossing, Ill.
- Taps and Dies.**
Butterfield & Co., Derby Line, Vt.
Carpenter, J. M., Tap & Die Co., Pawtucket, R. I.
Manning, Maxwell & Moore, 111 Liberty St., N. Y.
Wells Bros. & Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.
- Testing Laboratories.**
Riehle Bros. Testing Mach. Co., Philadelphia.
- Testing Machines.**
Riehle Bros. Testing Mach. Co., Phila.
- Theatrical Hardware.**
Wollensak, J. F., Chicago, Ill.
- Thill Springs.**
Frost Thill Spring Co., Boston, Mass.
Sabin Machine Co., Montpelier, Vt.
- Thrust Collars.**
Gouverneur Mach. Co., Gouverneur, N. Y.
- Timber and Mineral Lands.**
Robertson, E. Co., Cincinnati, O.
- Time Record.**
Scattergood, H. W., Phila., Pa.
- Tinning Process.**
Sands, Thos., Nashua, N. H.
- Tin Plate Machinery.**
Lloyd Booth Co., Youngstown, Ohio.
- Tire Upsetters.**
Butts & Ordway, Boston, Mass.
- Toe Calks, Steel.**
Burke, P. F., Boston, Mass.
- Tool Blocks.**
Hulbut-Rogers Mch. Co., South Sudbury, Mass.
- Tool Chests.**
Am. Tool Co., 200 W. Houston St., N. Y.
- Tool Holders.**
Armstrong Bros. Tool Co., Chicago, Ill.
- Tools.**
Brown, R. H. & Co., New Haven, Conn.
Hogson & Pettis Mfg. Co., New Haven, Conn.
Mayhew, H. H. Co., Shelburne Falls, Mass.
Millers Falls Co., 93 Reade, N. Y.
Richardson, C. F. & Son, Athol, Mass.
Standard Tool Co., Athol, Mass.
Stanley Rule & Level Co., 29 Chambers.
Starrett, L. S., Athol, Mass.
Stevens, J. Arms & Tool Co., Chicopee Falls, Mass.
- Tools, Blacksmith and Wheelwright.**
Buffalo Forge Co., Buffalo, N. Y.
Butts & Ordway, Boston, Mass.
Champion Blower & Forge Co., Lancaster, Pa.
Plumb, Fayette R., Philadelphia, Pa.
Wiley & Russell Mfg. Co., Greenfield, Mass.
- Tools, Steam and Gas Fitters'.**
Saunders' Sons, D., Yonkers, N. Y.
- Tools, Tinnners'.**
Peerless Cooker Co., Buffalo, N. Y.
- Torches, Oil and Gasoline.**
Dangler Stove & Mfg. Co., Cleveland, O.
Schneider & Trenkamp Co., Cleveland, Ohio.
- Transom Litters.**
Wollensak, J. F., Chicago, Ill.
- Trucks, Manufacturers of.**
Clark, G. P., Windsor Locks, Conn.
- Tubes, Seamless Drawn Copper.**
Ansonia Brass & Copper Co., 19 and 21 Cliff, N. Y.
Randolph & Clowes, Waterbury, Conn.
- Tubes, Steel.**
Avery Stamping Co., Cleveland, O.
Leng's, John S. Son & Co., 4 Fletcher St., New York.
U. S. Projectile Co., Brooklyn, N. Y.
- Tumbling Barrels.**
Henderson Bros., Waterbury, Conn.
- Turnbuckles.**
Cleveland City Forge & Iron Co., Cleveland, O.
Merrill Bros., Brooklyn, E. D.
- Twist Drills, Makers of.**
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford, Mass.
New Process Twist Drill Co., Taunton, Mass.
Standard Tool Co., Cleveland.
- Valves, Gas, Water and Steam.**
Chapman Valve Mfg. Co., Boston.
Eaton-Evans Mfg. Co., Philadelphia, Pa.
Jenkins Bros., 71 John, N. Y.
Lunkenheimer Co., Cincinnati, O.
McNab & Harlin Mfg. Co., 56 John, N. Y.
- Ventilator Appliances.**
Howard & Morse, 45 Fulton St., N. Y.
- Vise Jaws.**
Newark Mch. Tool Co., Newark, N. J.
- Vises.**
Hollands Mfg. Co., Erie, Pa.
Howard Iron Works, Buffalo, N. Y.
Millers Falls Co., 93 Reade St., N. Y.
Prentiss Vise Co., 44 Barclay, N. Y.
- Wagon Jacks.**
Covert Mfg. Co., West Troy, N. Y.
Covert's Saddlery Works, Farmer, N. Y.
- Washers.**
Haskell, Wm. H. Co., Pawtucket, R. I.
Milton Mfg. Co., Milton, Pa.
Newbury, Jay Herbert, Gunderland, N. Y.
Sternbergh, J. H. & Son, Reading, Pa.
- Watches.**
Ingersoll, R. H. & Bro., 85 Cortlandt St., N. Y.
- Water Meters.**
Worthington, Henry R., 86 & 88 Liberty St., N. Y.
- Water Wheels.**
Poole, Robt. & Son Co., Baltimore, Md.
- Wheelbarrows.**
Amer. Steel Scraper Co., Sidney, Ohio.
Bryan Mfg. Co., Bryan, Ohio.
Sidney Steel Scraper Co., Sidney, O.
- Window Cleaners.**
Bourke Mfg. Co., Youngstown, O.
- Window Cord, Makers of.**
Samson Cordage Works, Boston, Mass.
- Wire, Manufacturers of.**
Gautier Steel Department of Cambria Iron Co., Johnstown, Pa.
Miller & Van Winkle, Brooklyn, N. Y.
New Castle Wire Nail Co., New Castle, Pa.
New Haven Wire Mfg. Co., New Haven, Conn.
Prentiss, Geo. W. & Co., Holyoke, Mass.
Salem Wire Nail Co., Salem, O.
Trenton Iron Co., Trenton, N. J.
Washburn & Moen Mfg. Co., Worcester.
Wetherell Bros., 93 Liberty St., N. Y.
Wolff, R. H. & Co., Ltd., 118th St. and Harlem River, N. Y.
Wright & Colton Wire Cloth Co., Worcester, Mass.
- Wire Cloth.**
Barnum, E. T., Detroit, Mich.
Clinton Wire Cloth Co., Clinton, Mass.
Darby, Edward & Sons, Philadelphia.
Estey, W. S., 66 Fulton, N. Y.
Gilbert & Bennett Mfg. Co., 42 Cliff, N. Y.
Howard & Morse, 45 Fulton, N. Y.
Ludlow-Saylor Wire Co., St. Louis, Mo.
N. J. Wire Cloth Co., Trenton, N. J.
Scheeler & Sons, Buffalo, N. Y.
Wickwire Bros., Cortland, N. Y.
Wright & Colton Wire Cloth Co., Worcester, Mass.
W. S. Tyler Wire Works Co., 'Cleve'd.
- Wire Cutters.**
King, J. M. & Co., Watertown, N. Y.
- Wire Dies.**
McFarland, Wm., Trenton, N. J.
Newton & Shipman, 83 John St., N. Y.
- Wire Fences, See Fencing, Iron and Wire.**
- Wire Goods, Manufacturers of.**
Bromwell Brush & Wire Goods Co., Cincinnati, Ohio.
Darby, Edward & Sons, Phila.
Gilbert & Bennett Mfg. Co., 42 Cliff St., N. Y.
Ludlow-Saylor Wire Co., St. Louis.
Ossawan Mills Co., Norwich, Conn.
Scheeler & Sons, Buffalo, N. Y.
Wickwire Bros., Cortland, N. Y.
Williamson, C. T., Wire Novelty Co., Newark, N. J.
Wire Goods Co., Worcester, Mass.
- Wire Machinery.**
Am. Tool Wks., Cleveland, O.
Manville, E. J. Mch. Co., Waterbury, Ct.
Morgan Construction Co., Worcester, Mass.
Waterbury Mch. Co., Waterbury, Conn.
- Wire Straightening and Cutting Machinery.**
Adt, John & Son, New Haven Conn.
- Wire Nails.**
Bond Nail Co., Raynham, Mass.
Indiana Wire Fence Co., Crawfordsville, Ind.
Kilmer Mfg. Co., Newburg, N. Y.
New Castle Wire Nail Co., New Castle, Pa.
Phillips, Townsend & Co., Phila., Pa.
Salem Wire Nail Co., Salem, O.
Taunton Wire Nail Co., Taunton, Mass.
Whitney, A. R. & Co., New York City.
- Wire Rods, Steel.**
New Castle Wire Nail Co., New Castle, Pa.
Washburn & Moen Mfg. Co., Worcester, Mass.
Whitney, A. R. & Co., 17 B'way, N. Y.
Wolff, R. H. & Co., Ltd., 118th Street and Harlem River, N. Y.
- Wire Rope, Iron and Steel, Makers.**
Broderick & Bascom Rope Co., St. Louis, Mo.
California Wire Works, San Francisco.
Hazard Mfg. Co., Wilkesbarre, Pa.
A. Leschen & Sons Rope Co., St. Louis.
Trenton Iron Co., Trenton, N. J.
Washburn & Moen Mfg. Co., Worcester, Mass.
- Wire Rope Machinery.**
Kay, J. F., Passaic, N. J.
- Wood Turning.**
Cleveland Wood Turning Co., Cleveland, O.
- Wood-Working Machinery.**
Egan Co., Cincinnati, Ohio.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.
- Wrenches, Manufacturers**
Bemis & Call Hardware & Tool Co., Springfield, Mass.
Billings, Spencer & Co., Hartford, Conn.
Coes Wrench Co., Worcester, Mass.
Trimont Mfg. Co., Roxbury, Pa.
Walworth Mfg. Co., Boston, Mass.
Williams, J. H., Brooklyn, N. Y.
- Wringers.**
Colby Wringer Co., Montpelier.
Peerless Mfg. Co., Cleveland, Ohio.
- Yacht Hardware.**
Ferdinand, L. W. & Co., Boston, Mass.

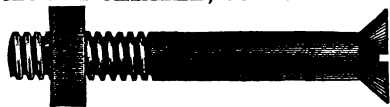
ALPHABETICAL INDEX TO ADVERTISERS.

Abbott, Wheelock & Co.	16	A. & F.	45	Crawford Mfg. Co.	71	Goulds Mfg. Co.	32
Acme Shear Co.	65	Brown, E. E. & Co.	78	Crescent Horse Shoe & Iron Co.	83	Gouverneur Machine Co.	44
Adt, John & Son.	43	Brown Holsting & Conveying Mch. Co.	32	Crescent Phosphorized Metal Co.	3	Graham, John H. & Co.	74
Atna-Standard Iron & Steel Co.	18	Brown, R. H. & Co.	53	Crescent Steel Co.	14	Grand Crossing Tack Co.	10
Aiken, Henry	23	Bryan Mfg. Co.	36	Cresson, Geo. V. Co.	42	Grand Rapids Cycle Co.	71
Alexander Bros.	33	Bryden Horse Shoe Co.	81	Croissant, M.	74	Green, A. H.	76
Allentown Hdw. Wks.	25	Buck Bros.	65	Crosby, G. A. & Co.	35	Griffith, Axtell & Cady Co.	57
Allentown Rolling Mills.	26	Buck, Chas.	65	Crown Smelting Co.	3	Haight & Clark.	25
Am. Bolt Co.	89	Buckeye Mfg. Co.	28	Cushman Chuck Co.	40	Halk & Naumann.	8
Am. Metal Co.	3	Buffalo Forge Co.	99	Dallett, Thos. H. & Co.	42	Halsey, Jas. T.	40
Am. Pig Iron & Storage Warrant Co.	17	Buffalo Scale Co.	84	Dame, Stoddard & Kendall.	70	Halsey, W. S. & Co.	22
Am. Screw Co.	11	Burden Iron Co.	81	Dangler Stove & Mfg. Co.	69	Hamilton Machine Tool Co.	36
Am. Steel Scraper Co.	86	Burke, P. F.	83	Darby, Edw. & Sons.	8	Hammer & Co.	84
Am. Tool Co.	43	Burr & Houston Co.	21	Davis, I. B. & Son.	25	Hardware Board of Trade.	61
American Tool Works.	48	Bussenius & Cunliffe.	48	Davis, W. P.	48	Harrington, E., Son & Co.	45
Ames Sword Co.	78	Butler, C. N.	6	Davol, John & Sons.	2	Harrington & King Perforating Co.	9
Amidon Tool Corporation.	64	Butterfield & Co.	40	Dean Bros. Steam Pump Works.	31	Harris Mfg. Co.	71
Ansonia Brass & Copper Co.	2	Butts & Ordway.	35	Decatur Shaft Support Co.	88	Harris, Wm. A. Steam Engine Co.	27
Arcade File Works.	62	Butze, Adolph.	51	DeHaven Mfg. Co.	67	Harrison Safety Boiler Wks.	28
Arcade Malleable Iron Co.	20	C. & C. Electric Co.	26	Deitz, A. E.	76	Hart Mfg. Co.	40
Arcade Mfg. Co.	75	Caldwell Mfg. Co.	78	Deming Co.	58	Hartford Steam Boiler Insp. and Ins. Co.	28
Armstrong Bros. Tool Co.	44	California Wire Works.	6	Detrick & Harvey Machine Co.	45	Hartley & Graham.	1
Armstrong Mfg. Co.	36	Cambria Iron Co.	17&20	Diamond Clamp & Flask Co.	98	Haskell, Wm. H. Co.	90
Artificial Gas Engineering Co.	24	Cambridge Iron & Steel Co.	13	Diamond State Iron Co.	81	Hazard Mfg. Co.	6
Athol Machine Co.	59	Cambridge Roofing Co.	13	Dienelt & Eisenhardt.	37	Heinrich's R. Sons Co.	65
Atlas Tack Corporation.	10	Canfield, H. O.	33	Dietz, Schumacher & Co.	38	Henderer, A. L.	37
Avery Stamping Co.	67	Capewell Horse Nail Co.	82	Dille & McGuire Mfg. Co.	88	Henderson Bros.	21
Ayer, H. C. & Gleason Co.	26	Carbon Steel Co.	18	Disston, Henry & Sons.	61	Hendey Machine Co.	54
Babcock & Wilcox Co.	30	Carlin's Sons, Thomas.	48	Dixon, Jos., Crucible Co.	33	Hendricks Bros.	2
Baeder, Adamson & Co.	56	Carpenter J. M. Tap & Die Co.	97	Dodd, A. W. & Co.	97	Hendrick Mfg. Co. Ltd.	7
Banker & White.	63	Cary Mfg. Co.	67	Dodge Mfg. Co.	43	Hendryx, A. B. Co.	3
Bardsley, J.	84	Chadborne & Coldwell Mfg. Co.	88	Donaldson Iron Co.	21	Henley, M. C.	87
Barns, C. K. & Co.	20	Chambers Bros. Co.	90	Douglas, W. & B.	58	Herrick, J. A.	24
Barnes, W. F. & John.	35	Champion Blower & Forge Co.	40	Draper Machine Tool Co.	48	Hertz, T. & Son.	3
Barnett, G. & H.	63	Champion Iron Co.	7	Dudgeon, Richard.	38	Hill, Clarke & Co.	49
Barnum, E. T.	10	Champion Safety Lock Co.	51	Dunbar Bros.	4	Hobson, F., Seaman & Co.	16
Bass Foundry & Machine Works.	23	Chapman Valve Mfg. Co.	27	Dunham Nut Co.	89	Hoffman, J. W. & Co.	15
Bay State Stamping Co.	46	Chatillon, John & Sons.	69	Dupont Mfg. Co.	31	Hogan, John L. & Co.	15
Bellevue Pump Co.	59	Cheney, S. & Son.	21	Durant, W. N.	32	Hoggson & Pettis Mfg. Co.	40
Bement, Miles & Co.	37	Chess Bros.	21	Dwight Slate Machine Co.	35	Hollands Mfg. Co.	59
Bemis & Call Hardware & Tool Co.	84	Chester Steel Casting Co.	22	Eagle Bicycle Mfg. Co.	97	Holmes & Edwards Silver Co.	66
Berger Bros.	68	Chicago Fire Arms Co.	70	East Chicago Foundry Co.	21	Hooker-Colville Steam Pump Co.	49
Bethlehem Iron Co.	20	Chrome Steel Works.	17	Eccles, Richard.	79	Houston, C. B. & Co.	15
Bevin Bros. Mfg. Co.	71	Church, Isaac.	90	Eclipse Bicycle Co.	55	Howard Iron Works.	63
Bickford Drill & Tool Co.	36	Cincinnati Corrugating Co.	9	Egan Co.	36	Howard & Morse.	7
Bicycle Step Ladder Co.	72	Claffen Mfg. Co.	33	Enterprise Mfg. Co. of Pa.	72	Howson & Howson.	6
Bigelow, C. R.	49	Clapp, E. D. Mfg. Co.	79	Estey, W. S.	6	Hudson, C. E. & Co.	89
Bignall & Keeler Mfg. Co.	37	Clapp, Geo. M.	49	Ette & Henger Mfg. Co.	87	Hurlbut-Rogers Mch. Co.	36
Billings & Spencer Co.	84	Clark, G. P.	88	Etting, Edw. J.	15	Hutchinson, F. S. Co.	64
Bingham, W. Co.	71	Clark & Cowles.	6	Eureka Cast Steel Co.	98	Ideal Machine Works.	71
Birmingham Iron Foundry.	21	Clarke, Thomas.	59	Eustis, Jas. W. Co.	78	Ideal Mfg. Co.	47
Bissell, E. Son & Co.	51	Clauss Shear Co.	66	Evans-Friction Cone Co.	3	Independent Electric Co.	71
Black Mfg. Co.	71	Clendenin Bros.	12	Eynon-Evans Mfg. Co.	26	Indiana Wire Fence Co.	7
Blair Mfg. Co.	87	Cleveland Block Co.	79	F. & N. Mfg. Co.	85	Ingersoll, R. H. & Bro.	60
Blake & Johnson.	12	Cleveland City Forge & Iron Co.	1	Fairmount Machine Co.	45	Iowa Farming Tool Co.	85
Bliss Co., E. W.	34	Cleveland City Forge & Iron Co.	1	Fearing, Wm. S.	2	Jacobus, W. H.	90
Boardman, L. & Son.	65	Cleveland Stamping & Tool Co.	76	Ferdinand, L. W. & Co.	70	Jarecki Mfg. Co.	39
Boker, Hermann & Co.	16	Cleveland Stone Co.	46	Fitch, W. & E. T.	97	Jeffrey Mfg. Co.	32
Bolzano Mfg. Co.	15	Cleveland Twist Drill Co.	42	Fitchburg Machine Works.	35	Jenkins Bros.	1
Bommer Bros.	98	Cleveland Wood Turning Co.	73	Flagg, Stanley G. & Co.	98	Jenkins & Lingle.	35
Bond Nail Co.	12	Clinton Wire Cloth Co.	8	Flint & Co.	18	Jenner, H. W. T.	6
Boone, W. C. Mfg. Co.	22	Cobb & Drew.	7	Folding Paper Box Co.	64	Jersey City Galvanizing Co.	13
Booth, The Lloyd Co.	25	Coburn Trolley Track Mfg. Co.	75	Fraim, E. T.	78	Jessop, Wm. & Sons.	16
Borden & Lovell.	12	Coes, Loring & Co.	85	Frankford Steel Co.	17	Johnson, I. H., Jr., & Co.	44
Borgner, Cyrus.	25	Coes Wrench Co.	85	Franklin, H. H. Mfg. Co.	49	Jones, B. M. & Co.	18
Boston Casting Co.	3	Coffin & Leighton.	31	Frost Thill Spring Co.	83	Jones & Lamson Machine Co.	54
Boston Gear Works.	28	Coiled Wire Belting Co.	75	Gardner, Jas. & Son.	24	Kanneberg Roofing Co.	13
Bourke Mfg. Co.	64	Colburn, A. M.	40	Garrison, A. Foundry Co.	18	Kay, J. F.	4
Box, Alfred & Co.	45	Colburn Electric Mfg. Co.	24	Gartland Foundry Co.	18	Kayser, Ellison & Co.	16
Boyce Rivet Co.	98	Colby Wringer Co.	69	Garvin Machine Co.	49	Keely, Jerome & Co.	15
Bradlee & Co.	14	Coldwell Lawn Mower Co.	89	Gautier Steel Department.	13	Keene Mfg. Co.	70
Bradley Fertilizer Co.	30	Coleman, J. A.	50	Gaylord, F. L. Co.	3	Kennedy, Julian.	23
Brass Goods Mfg. Co.	2	Columbian Novelty Co.	56	Gibbs Mfg. Co.	87	Keuffel & Esser Co.	59
Bridgeport Gun Implement Co.	70	Conroy, P. J. & Co.	69	Gilbert & Bennett Mfg. Co.	8	Keys, W. W. & R. M. Co.	3
Bridgeport Mch. Tool Works.	47	Continental Iron Works.	28	Gleason Tool Co.	27	Keystone Clutch & Machine Works.	40
Briggs, Marvin.	40	Corning, Edw. & Co.	14	Goddard, Asa.	35	Kilmer Mfg. Co.	7
Bristol Co.	1	Correspondence School of Mechanics.	55	Goodell Co.	77	King & Andrews.	47
Britton, J. Blodgett.	22	Cotton, Barclay W. & Co.	14	Goodell, J. W. Co.	64	King, J. M. & Co.	63
Broderick & Bascom Rope Co.	6	Covert Mfg. Co.	83	Gould & Eberhardt.	32	Kohler, F. E. & Co.	87
Bromwell Brush & Wire Goods Co.	72	Covert's Saddlery Works.	55				
Bronson Supply Co.	99	Cox, Justice Jr.	15				
		Cramp, Wm. & Sons S. & E. B. Co.	3				

Kretschmer, B. & Sons.....	25	New Haven Copper Co.....	37	Richards, I. P.	97	Talcott, W. O.....	32
Krogsrud, W.....	63	New Haven Mfg. Co.....	37	Ridgway, Craig & Son.....	44	Taunton Locomotive Mfg. Co.....	29
La Belle Steel Co.....	19	New Haven Wire Mfg. Co.....	6	Riehle Bros. Testing Machine Co.....	32	Taunton Wire Nail Co.....	19
Lafin & Rand Powder Co.....	21	N. J. Wire Cloth Co.....	8	Riverside Iron Works.....	18	Thomson, W. H. & Co.....	15
Lane Brothers.....	78	New Process Twist Drill Co.....	42	Roberts, A. & P. & Co.....	17	Tiebout, W. & J.....	79
Laughlin, Alex. & Co.....	23	Newton & Shipman.....	16	Roberts Mfg. Co.....	32	Titchener, E. H. & Co.....	7
Lee, J. Tatnall & Co.....	19	N. Y. Belting & Packing Co.....	33	Robertson, E. C.....	61	Toed, Wm. & Co.....	28
Lean, D. R. Co.....	24	N. Y. Powder Co.....	21	Robinson-Rea Mfg. Co.....	23	Tomney, Frank.....	49
League Cycle Co.....	97	N. Y. Iron Roofing & Corrugating Co.....	10	Rochester Lamp Co.....	69	Torrey, J. R. Razor Co.....	65
Le Count, C. W.....	83	Nicholson File Co.....	63	Rogers, The Wm. Mfg. Co.....	66	Totten & Hogg Iron and Steel Fdry.	
Leechburg Foundry & Machine Co.....	21	Nicolls, Wheeler & Co.....	14	Rome Brass & Copper Co.....	2	Co.....	21 & 30
Leong's, Jno. S. Son & Co.....	98	Niles Tool Works.....	50	Rowland, Wm. & Harvey.....	18	Townsend, W. P. & Co.....	90
Leonard, B. E.....	85	North Bros. Mfg. Co.....	17 & 55	Russell, Burdall & Ward.....	98	Tracy, A. J. Co., Ltd.....	59
Leonard, J.....	20	Northampton Cutlery Co.....	68	Russia Cement Co.....	57	Trenton Iron Co.....	4
Leschen, A. & Sons Rope Co.....	6	Northampton Emery Wheel Co.....	46	Sabin Machine Co.....	5	Trethewey Mfg. Co.....	23
Levis, Henry & Co.....	20	Norton Bros.....	79	Salem Wire Nail Co.....	12	Trimont Mfg. Co.....	84
Lidgerwood Mfg. Co.....	98	Norton Emery Wheel Co.....	46	Samson Cordage Works.....	1	Tuck Mfg. Co.....	10
Lincoln Iron Works.....	36	Norwalk Iron Works Co.....	31	Samuel, Frank.....	14	Tudor Iron Works.....	1
Lindsay, Jas. G. & Co.....	15	Obermayer, S. Co.....	20	Sands, Thomas.....	46	Tyler Wire Works Co. W. S.....	51
Link-Belt Engineering Co.....	35	Ogden & Wallace.....	20	Saunders's Sons, D.....	38	Union Mfg. Co.....	41
Lockhart Iron & Steel Co.....	16	Old Dominion Iron & Nail Works Co.....	31	Scattergood, H. W.....	47	Union Metallic Cartridge Co.....	1
Long & Allstatter Co.....	38	Ossawan Mills Co.....	97	Scheeler & Sons.....	5	Union Show Case Co.....	73
Lovegrove & Co.....	49	Oster Mfg. Co.....	41	Schneider & Trenkamp Co.....	76	U. S. Projectile Co.....	38
Lovell, Jno. P. Arms Co.....	71	Ostrander Fire Brick Co.....	25	Scott, Geo. M.....	35	Valentine, M. D. & Bro. Co.....	25
Ludlow-Saylor Wire Co.....	7	Ostrander, W. R. & Co.....	57	Scoville Mfg. Co.....	2	Valley Pump Works.....	80
Lufkin Rule Co.....	59	Otto Gas Engine Works.....	29	Scranton & Co.....	35	Van Dorn Iron Works Co.....	7
Lukens Iron & Steel Co.....	14	Packer, C. W.....	55	Scranton Forging Co.....	81	Van Wagoner & Williams Hdw. Co.....	98
Lundberg, Gustaf.....	17	Palmer & De Mooy Fdry. Co.....	22	Seaman, Sleeth & Black.....	21	Vulcan Iron Works.....	25
Lunkenheimer Co.....	27	Palmer Hardware Mfg. Co.....	56	Sebastian Lathe Co.....	44	Walker Mfg. Co.....	23
McCabe, J. J.....	48	Pancoast Henry B. & Co.....	39	Sellers, Wm. & Co.....	45	Wallace Wm. H. & Co.....	20
McCaffrey File Co.....	63	Parker, Chas. Co.....	72	Seneca Falls Mfg. Co.....	44 & 60	Walworth Mfg. Co.....	97
McClure & Amsler.....	24	Passaic Rolling Mill Co.....	20	Sessions Foundry Co.....	22	Wardlow, S. & C.....	16
McCoy, Jos. F. & Co.....	43	Peck, A. G. & Co.....	90	Seyfert's Sons, L. F.....	48	Washburn & Moen Mfg. Co.....	4
McFarland, Wm.....	4	Peerless Cooker Co.....	46	Shepard, Sidney & Co.....	58	Waterbury Brass Co.....	2
McGowan, J. H. & Co.....	31	Peerless Mfg. Co.....	77	Shoenberger & Co.....	80	Waterbury Farrel Foundry & Ma-	
McIlvain, Wm. & Sons.....	26	Pennsylvania Bolt & Nut Co.....	89	Shultz Belting Co.....	1	chine Co.....	31
McKay, Jas. & Co.....	14	Penna. Diamond Drill & Mfg. Co.....	22	Sickels, Sweet & Lyon.....	64	Waterbury Machine Co.....	34
McKinney Mfg. Co.....	77	Penna. Elevator Engineering Co.....	42	Sidney Steel Scraper Co.....	87	Watson & Stillman.....	38
McLean, John.....	28	Pennsylvania Mch. Co.....	48	Sigourney Tool Co.....	41	Webster, Warren & Co.....	27
McNab & Harlin Mfg. Co.....	28	Perry, W. H. & Co.....	50	"Silver Finish".....	12	Wells Bros. & Co.....	41
Machinists' Supply Co.....	49	Perry & Whipple Co.....	79	Silver Mfg. Co.....	88	Wells, Heber.....	47
Mahoning Valley Iron Co.....	20	Philadelphia Drop Forge Co.....	21	Simonds Mfg. Co.....	60	Wetherell Bros.....	16 & 19
Main Belting Co.....	33	Philadelphia Engineering Wks.....	24	Singer, Nimick & Co.....	19	Wetherhill, Robt. & Co.....	97
Manning, Maxwell & Moore.....	42	Phillips, Townsend & Co.....	6	Skinner Chuck Co.....	40	White, A. A. & Co.....	63
Marville Machine Co., E. J.....	47	Phoenix Horseshoe Co.....	81	Smith & Egge Mfg. Co.....	41	White, L. & I. J. Co.....	65
Mansfield, H. H.....	49	Phoenix Iron Co.....	14	Smith, H. D. & Co.....	83	White Mt. Freezer Co.....	55
Mars & Beekley.....	45	Phosphor Bronze Smelting Co.....	3	Smith, J. D. Foundry Supply Co.....	22	White, Van Glahn & Co.....	64
Maslin, J. & Son.....	31	Pierson & Co.....	17	Smith's Fattern Works.....	23	Whiting Foundry Equipment Co.....	24
Mathiesen & Hegeler Zinc Co.....	2	Pike Mfg. Co.....	64	Smythe, S. R. Co., Inc.....	23	Whitlock, Wm.....	40
Maurer, H. & Son.....	26	Pilling & Crane.....	15	Sommer's Son, John.....	98	Whitlock Coll Pipe Co.....	29
Mayhew, H. H. Co.....	60	Pittsburgh I. & S. Eng. Co.....	24	Southwark Foundry & Machine Co.....	27	Whitney, A. R. & Co.....	17
Merrill Bros.....	27	Pittsburgh Mfg. Co.....	33	Specialty Mfg. Co.....	65	Whiton, D. E. Mch. Co.....	40
Merrill Mfg. Co.....	38	Pittsburgh Reduction Co.....	54	Spedel, J. G.....	45	Wickwire Bros.....	7
Merriman, A. H.....	34	Place, Geo.....	48	Spencer's I. S. Sons.....	25	Wilcox & Howe Co.....	83
Miles, F. S.....	12	Plumb, Fayette R.....	66	Springfield Gas Engine Co.....	27	Wiley & Russell Mfg. Co.....	39 & 98
Miller & Van Winkle.....	4	Plume & Atwood Mfg. Co.....	2	Standard Fdry. & Mfg. Co.....	19	Williams, J. H. & Co.....	84
Millers Falls Co.....	56 & 98	Pollock, W. B. & Co.....	28	Standard Horse Shoe Co.....	81	Williamson, C. T. Wire Nov. Co.....	61
Milne, A. & Co.....	17	Poole, Robt. & Son Co.....	30	Standard Tool Co.....	42	Wilmot & Hobbs Mfg. Co.....	1
Milton Mfg. Co.....	89	Pope Mfg. Co.....	55	Stanley Rule & Level Co.....	97	Wilson, E. H. & Co.....	17
Miner & Peck Mfg. Co.....	37	Popping, J.....	47	Stanley Works.....	78	Wilson, John.....	64
Missouri Metal Co.....	2	Port Chester Bolt & Nut Co.....	89	Stark Mch. & Tool Co.....	32	Wilson, J. Fred.....	90
Mohr, J. J.....	15	Portland Lawn Sprinkler Co.....	87	Starrett, L. S.....	59	Wilson, W. A.....	37
Monce, S. G.....	70	Pottstown Iron Co.....	17	Steam Gauge & Lantern Co.....	69	Winslow, Sam'l, Skate Mfg. Co.....	70
Montour Iron & Steel Co.....	20	Pottsville Iron & Steel Co.....	14	Stearns, E. C. & Co.....	54	Wire Goods Co.....	6
Moore, Dr. Glendon E.....	54	Powell Planer Co.....	37	Steptoe, J. & Co.....	50	Wister, Francis.....	15
Moore Mfg. & Foundry Co.....	45	Pratt & Cady Co.....	37	Sterling Cycle Works.....	71	Wister, L. & R. & Co.....	20
Moore & White Co.....	41	Prentiss Tool & Supply Co.....	48	Sterling Aluminum Co.....	61	Wohler Aluminum Co.....	76
Moorhead-McCleane Co.....	19	Prentiss, Geo. W. & Co.....	5	Sterling Emery Wheel Co.....	48	Wolf, W. & L.....	78
Morgan Construction Co.....	4	Prentiss Vise Co.....	57	Sternbergh, J. H. & Son.....	90	Wolff, R. H. & Co. Ltd.....	5
Morgan Spring Co.....	4	Pullman Sash Balance Co.....	65	Stevens, J. Arms & Tool Co.....	62	Wollensak, J. F.....	60, 75 & 79
Morley Bros.....	75	Putnam Nail Co.....	82	Steward & Romaine Mfg. Co., Ltd.....	87	Wood Alan & Co.....	15
Morrison, Robert.....	76	Quint, A. D.....	38	Stiles & Parker Press Co.....	34	Wood, R. D. & Co.....	22
Morse Twist Drill & Machine Co.....	42	Rainey, W. J.....	1	Stirling Co.....	29	Wood, W. Dewees Co.....	19
Morse, Williams & Co.....	45	Randall Fence Co.....	10	Stocking, E. B.....	6	Worcester Mch. Screw Co.....	90
Morton, Thos.....	84	Randolph & Clowes.....	1	Storm Mfg. Co.....	58	Worthington, Henry R.....	31
Moseley Iron Bridge & Roof Co.....	10	Ransom Hardware Co.....	75	Stover Mfg. Co.....	78	Wright & Colton Wire Cloth Co.....	8
Mount Carmel Bolt Co.....	97	Reading Hardware Co.....	79	Stow Flexible Shaft Co.....	42	Wrightsville Hardware Co.....	55
Murphy, P. D.....	60	Read, Wm. & Sons.....	97	Stow Mfg. Co.....	42	Wurster, F. W. & Co.....	98
Myers, F. E. & Bro.....	58	Reece, Edw. F.....	40	Streeter, N. R. & Co.....	73	Wyman & Gordon.....	84
National Horse Nail Co.....	83	Reeves, Paul S.....	98	Sturtevant, B. F. Co.....	37	Yale & Towne Mfg. Co.....	44 & 57
National Pipe Bending Co.....	29	Republic Press.....	30	Superior Steel Co.....	5		
National Saw Co.....	60	Reynolds & Co.....	10	Supplee Hardware Co.....	88		
Newark Machine Tool Works.....	54	R.I. Perkins Horse Shoe Co.....	81	Sweetser, W. A.....	20		
Newbury, Jay H.....	89	Rhodes, L. E. Co.....	47	Swindell, W. & Bros.....	23		
New Britain Hardware Mfg. Co.....	87	Rice Mfg. Co.....	22	Taintor Mfg. Co.....	60		
New Castle Wire Nail Co.....	12	Richardson, C. F. & Son.....	60	Tablet & Ticket Co.....	47		

Published by DAVID WILLIAMS, 96-102
Reade Street, New York. Printed by
THE WILLIAMS PRINTING CO., Gen-
eral Book, Commercial and News
paper Printers and Binders, 96-100
Reade St., New York

WHEN IN NEED Address **MOUNT CARMEL BOLT CO.,**
MOUNT CARMEL, CONN.

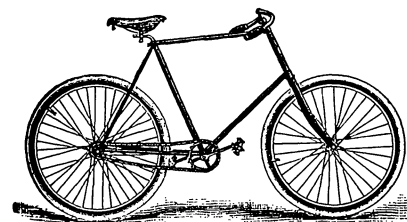


OUR AGENTS MAKE MONEY.

We Make

Wheels to Sell and

Stay Sold.



THE EAGLE BICYCLE MFG. CO.,
TORRINGTON, CONN.

FIRST AND ONLY
IN THE WORLD TO MAKE

ALUMINUM RIMS AND CLINCHER TIRES.

THE PRATT & CADY CO.,

—MANUFACTURERS OF—

IRON, BRASS COMPOSITION AND BRONZE CASTINGS

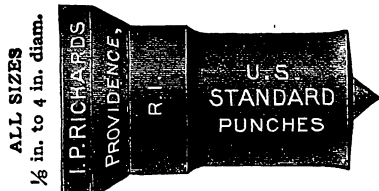
Special facilities enable us to execute orders promptly. Prices reasonable for high grade work.

WILLIAM A. HARRIS, SELLING AGENT, - **HARTFORD, CONN.**

The "DODD'S" LIQUID GLUE.

It gives Perfect Satisfaction.

Best. A. W. DODD & CO., Gloucester, Mass.



For Punching
IRON AND STEEL.

Mechanics.—The Technical Student's Introduction to. Being a series of Practical Papers showing the leading Principles of Physical Science, Exemplified in the Properties of Bodies or Materials; the laws which Regulate the Phenomena of Motion, of Heat, of the Atmosphere, of Water at Rest and in Motion, etc., etc., as applied to the Practical Work of the Architect and Builder, the Engineer and Machinist, and the General Artisan engaged in the Designing and Construction of Machines, Tools, and Appliances Useful in the Industrial Arts. By Various Writers. Edited by Robert Scott Burn. About 150 Illustrations, \$2.00
For sale by David Williams, 96-102 Reade St., N. Y.

WEST'S MOULDERS' TEXT BOOK

BEING PART II. OF AMERICAN FOUNDRY PRACTICE,

Giving the best methods and rules for obtaining good castings, with detailed description for making moulds. A thoroughly practical book that should be in the hands of every moulder.

PRICE, - Cloth, - 460 Pages, - - \$2.50.

SENT, POST-PAID, ON RECEIPT OF PRICE BY

DAVID WILLIAMS, Publisher and Bookseller,

96-102 Reade Street.

New York City.

WALWORTH MFG. CO., Boston, Mass.

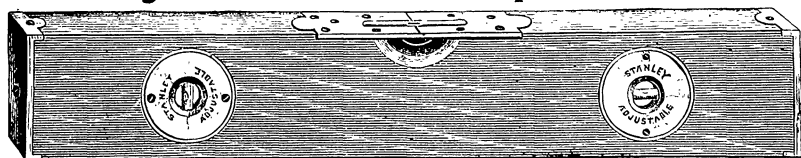
STEAM, WATER AND GAS GOODS IN ENDLESS VARIETY

—SEND FOR CATALOGUE.—

PLUMBERS' AND FITTERS' TOOLS AND SUPPLIES.

Tools for cutting and threading Wrought Iron Pipe, Die Plates and Dies, Stillson Pipe Wrench, Miller's Ratchet Die Plate, Brass and Iron Valves and Cocks, Wrought Iron Pipe and general Machinists' Supplies.

Stanley's Patent Duplex Levels.

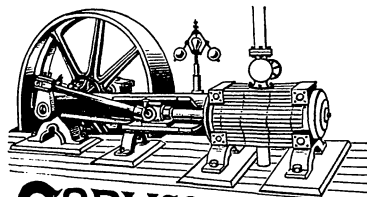


These Levels have the ordinary form of leveling-glass, set in the top surface of the Stock: as three-fourths of the uses of a Level are best secured by looking down upon the instrument from above.

For any uses by which an observation of the glass, sidewise, may be found convenient, an additional leveling-glass is set in the side, at the opposite end from the Plumb.

Both glasses are protected by Brass Discs; can be seen from either side; and are inserted in the Level, with the least possible removal of wood from the Stock.

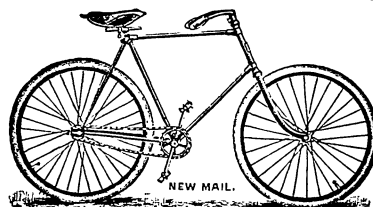
Manufactured by **STANLEY RULE & LEVEL CO., New Britain, Conn.**
SOLD BY ALL HARDWARE DEALERS.



CORLISS ENGINES
MACHINISTS
IRON FOUNDERS, BOILER MAKERS.
ROBT. WETHERILL & CO.
CHESTER, PA.

Special Special

TRADE PRICES FOR JUNE ON
NEW MAILS.



Finest High Grade of '94. In great demand everywhere. Write us NOW for quotations.

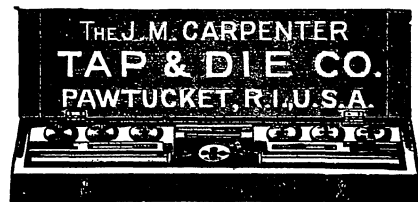
MANUFACTURERS,

WM. READ & SONS,
107 WASHINGTON ST., BOSTON, MASS.



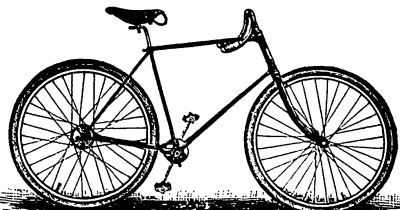
Twisted "Giant" and "Crown" Clothes Lines
Samples and prices mailed now.

OSSAWAN MILLS CO., - Norwich, Conn.



A SATISFIED CUSTOMER

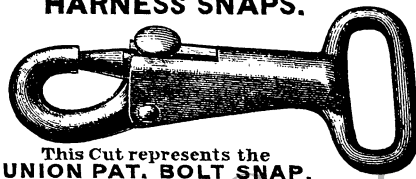
is the best advertisement. This is the way they talk when asked how they like



THE LEAGUE CHAINLESS

after a 40-mile ride over hills and muddy roads: "If I was buying 50 bicycles 49 of them would be the League Chainless, and the 50th a chain machine for a relic!" This simply voices the opinions of thousands of others who have ridden the League Chainless. **THE LEAGUE CYCLE CO., Hartford, Ct.**

THE W. & E. T. FITCH CO.,
NEW HAVEN, CONN.
Manufacturers of a variety of
HARNESSE SNAPS.



This Cut represents the
UNION PAT. BOLT SNAP.

PAUL S. REEVES,
Philadelphia.

Phosphor Bronze

AND

BABBITT METALS.

Lead Lined Car Bearings a Specialty.

Brass and Phosphor Bronze Castings from ¼ pound to 20,000 pounds in weight.

BUFFALO SHAVING EXHAUSTERS.
FOR HANDLING REFUSE IN ALL WOOD WORKING INDUSTRIES
BUFFALO FORGE CO. BUFFALO, N.Y. U.S.A.

PROGRESSIVE AND APARTMENT TYPES
BUFFALO LUMBER DRY KILNS.
BUFFALO FORGE CO. BUFFALO, N.Y. U.S.A.

NORWAY IRON RIVETS.
FOR ALL PURPOSES.
WRITE FOR PRICES TO
THE BOYCE RIVET CO.
MUNCIE, INDIANA.

THE DIAMOND BRASS DOWEL PIN AND WOOD FILLET.
MADE BY THE D.C. & F. CO. PHILADELPHIA, U.S.A.

STEEL TUBES
JOHN S. LENG'S SON & CO., NEW YORK.

The Metal Worker's Handy-Book
OF RECEIPTS AND PROCESSES,

BEING A COLLECTION OF CHEMICAL FORMULAS AND PRACTICAL MANIPULATIONS FOR THE WORKING OF ALL THE METALS AND ALLOYS, INCLUDING THE DECORATION AND BEAUTIFYING OF ARTICLES MANUFACTURED THEREFROM, AS WELL AS THEIR PRESERVATION.

Edited from Various Sources by

WILLIAM T. BRANNT.
500 Pages, Cloth, \$2.50.

Sent, postpaid, on receipt of price by

DAVID WILLIAMS, Publisher and Bookseller,
96-102 Reade Street, New York.

BOMMER



SPRING HINGES

Utility, Durability and Beauty Combined.

Our Circular B tells the rest. Send for it.

BOMMER BROS.,
351 & 353 Jay St., Brooklyn, N. Y.

STANLEY G. FLAGG & CO., Philadelphia, Pa.
Office and Works, N. W. Cor. 19th St. & Pennsylvania Ave.
Manufacturers of **STEEL CASTINGS,**
A Substitute for Steel and Wrought Forgings.
Circulars Sent on Application.

Automatic Screw Driver.

See Page 56.

MILLERS FALLS CO.,
93 Reade St., New York.

EUREKA CAST STEEL COMPANY.
Office and Works, Chester, Pa.
Open Hearth, Crucible and Eureka Steel Castings.
Railroad and Machine Castings.
Locomotive Cross-Heads and Gearing a Specialty.
Guaranteed Knuckles for M. C. B. Couplers.

SPRINGS AND AXLES
ROLLING MILL.
F. W. WURSTER & CO.
375 Kent Ave. Brooklyn N.Y.

FINE TAPS, DIES AND REAMERS.



LIGHTNING AND GREEN RIVER SCREW PLATES,
Bolt Cutters, Hand and Power Drilling Machines, Punching Presses, Tire Benders, Tire Upsetters and Other Labor Saving Tools. Send for New Catalogue.
WILEY & RUSSELL MFG. CO., Greenfield, Mass.

LIDGERWOOD
HOISTING ENGINES.
300 styles and sizes. Over 10,000 in use.
LIDGERWOOD MFG. CO., 96 Liberty St., N. Y.

ESTABLISHED
Spring Making, 1842. Steel Making, 1845.
Norway Iron, 1871 (Re-Rolled).

WM. & HARVEY ROWLAND,
MANUFACTURERS OF
Springs, Steel, Re-Rolled Norway
Iron & Slit Norway Nail Rods.
Address FRANKFORD P. O., PHILADELPHIA.



A. G. PECK & CO.
Cohoes, N. Y.
MANUFACTURERS OF
AXES, ADZES,
BROAD AXES,
HATCHETS.
Send for Catalogue and Price List.

THIS IS THE TIME TO BUY
Lemon Squeezers
WRITE FOR PRICES TO
JOHN SOMMER'S SON
355-365 Central Ave., Newark, N. J.

RUSSELL, BURDSALL & WARD,
Portchester, N. Y.,
Manufacturers of
Carriage, Tire, Plow and Stove
BOLTS

Carriage Bolts made from Best Square Iron a Specialty.

The Iron Age **HARDWARE** Price Books.

Bound in Grain Seal Leather.

A, B, C, D, E AND F.

Arranged in blank form, convenient for the hardware and metal trades, for pocket and office use.

Send for illustrated catalogue of books for Hardwaremen, giving descriptions and prices.

BOOK A, Four Editions.
4x7 Inches.
A, 200 pp \$1.00
A F, 200 pp., with flap 1.25
A 2, 400 pp 1.50
A F 2, 400 pp., with flap 1.75

BOOK B, Four Editions.
4x7 Inches.
B, 200 pp \$1.00
B F, 200 pp., with flap 1.25
B 2, 400 pp 1.50
B F 2, 400 pp., with flap 1.75

BOOK C, Four Editions.
4½x8 Inches.
C, 200 pp \$1.00
C F, 200 pp., with flap 1.25
C 2, 400 pp 1.50
C F 2, 400 pp., with flap 1.75

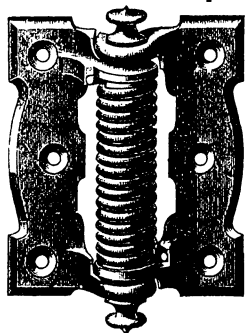
BOOK D, Four Editions.
5x8 Inches.
D, 240 pp \$2.00
D F, 240 pp., with flap 2.50
D 2, 480 pp 3.00
D F 2, 480 pp., with flap 3.50

BOOK E. 7½x10 inches, 310 pp \$5.00

BOOK F. 8½x11 inches, 476 pp 7.50

SENT, POSTPAID, ON RECEIPT OF PRICE BY
DAVID WILLIAMS, Publisher,
96-102 Reade Street, New York.

Columbia Spring Hinges



FOR
Screen
Doors.

Cast Iron,
Japanned.

These Hinges are very simple in construction. They are packed flat, with the tension of the Springs adjusted, and are "ready for business" as soon as attached to the door.

Having no small or loose parts, they cannot get out of order.
They are reversible and can be used on either Right or Left Hand Doors.

No. 14, 3 x 2½, Japanned.

1 Dozen pairs in a box. ½ Gross pairs in a case.
THE CHEAPEST AND BEST SPRINGS IN THE MARKET. SEND FOR PRICES.

MANUFACTURED BY
VAN WAGONER & WILLIAMS HDW. CO.,
Cleveland, Ohio, and 14 Warren Street, New York

THE IRON AGE

THURSDAY JULY 12, 1894.

Compound Locomotives.

At the recent convention of the American Railway Master Mechanics' Association, S. M. Vaucrain of the Baldwin Locomotive Works, said:

The ratio of compounds to simple engines is holding its own. Our experience since the last convention has led us to make what we think are useful improvements in the detail of our system of compound locomotives. The cavity of the valve, leading from the high pressure to the low pressure cylinder, has been enlarged with very beneficial results. The cylinder cock, has been done away with almost entirely, and we have substituted a plain cock

Large Sheet Metal Cutting or Blanking Dies.

Sheet metal cutting or blanking dies used in different trades have been made in many and various ways, to suit the respective requirements. The ordinary way of blanking is done on dies which allow the blank to fall through the female die. If a blank produced in this way has to be submitted to a second operation for perforating, hole cutting, &c., it is subjected to the action of a second die. For smaller parts, and especially in cases where the sheet metal from which the blanks are cut is in the shape of strips, so called successive dies have been adopted. Their action is just the reverse from the

absolute uniformity, such as parts of watches, clocks, &c. In this case a so-called sub-die takes the place. The die, male and female, really is a separate self-contained tool or machine, the press being used merely to supply the power for operating it and to furnish a strong support. A sub-die produces in one single, not consecutive, stroke, a finished blank, without feeding or re-gauging. It eliminates this element of inaccuracy and has furthermore the advantage of flattening the sheet while being cut, thus avoiding any variation of size due to buckling. The use of sub-dies has so far been mostly limited to smaller work.

Owing to the fact that in the construction of dynamos and motors abso-

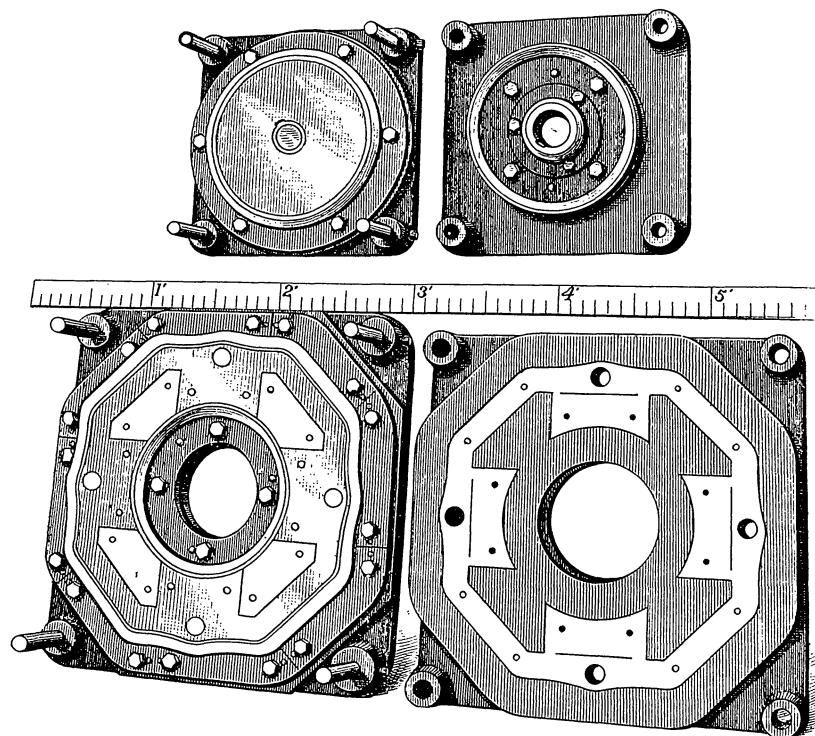


Fig. 1.—Dies for Cutting Ring and Armature Blanks.

LARGE SHEET METAL CUTTING OR BLANKING DIES.

for the low pressure cylinder and an ordinary three-way cock for the introduction of live steam from one end of the high pressure cylinder to the inoperative end of the low cylinder, thereby conducting steam to the low pressure cylinder. The apparatus is easily applied. I think these engines are now hauling the fastest trains that are run in the United States. About six months ago we addressed a circular to the users of compound engines asking them to let us know what the engines were doing in the way of economy and cost of repairs. From those roads having the largest number of compounds we seemed to get better results. We have several compounds running at 200 pounds steam pressure, and their performance is ahead of those engines running at 180 pounds. Instead of being afraid to carry 180 pounds, I would build boilers to run engines at 200 pounds steam pressure.

ones mentioned before, the perforating, forming, &c., being done first, the severing of the blank from the strip being the last. Each stroke of the press, with the exception of the first and last ones on a strip, produces a finished blank.

The capacity of these dies in many cases is increased by using movable stop gauges, which, because they are lifted out of the way, barely require the strip of metal to be pulled along. They dispense with lifting up the latter to clear the gauge. Feed motions of various kinds are also most advantageously employed in these cases. This system of dies is used in manufacturing parts of hardware, stamped goods, electrical instruments, &c. It has been brought to great perfection in button manufacturing, as many as from four to six operations being done in one die.

However, this method has the fault that slight inaccuracy does occur, which condemns it for work requiring

lute accuracy is a very desirable and ever necessary feature, and dies shown in the accompanying illustrations were made on a somewhat modified sub-die principle, accomplishing as much in one operation as has been done usually in two or three. The cutting part of these dies and punches consists of steel welded on wrought iron, cut up in sections in such a way as to avoid changing of shape in hardening as much as possible. The sections are hardened and ground to exact shape and are securely bolted and doweled to cast iron plates. The round dies are, of course, made in solid rings. Into the cast iron plate are also inserted the perforating punches and dies, but *vice versa* from the sections forming the cutting edges—i. e., the punches are driven into the lower die plate and the dies are fastened to the upper punch plate, except in cases where the upper cutting punch itself is also used as a perforating die. This feature makes it necessary to fasten

the punch plate to the press slide in such a way as to leave a space between the two for the wads to fall out.

The blank while being cut is held and flattened by yielding plates, backed up by strong springs. These plates serve also as shedders or strippers for throwing the blank out of the die. Both die and punch are hardened if used for black iron or steel. It is preferable to use inclined presses, so that the blank will slide out merely by force of gravity. Guide pins are provided to facilitate the setting of the dies and also to act as safeguards in case a die should shift.

The illustrations show quite a variety of very large dies for blanks, as used for armatures for bipolar and multipolar dynamos, and also for laminated magnetic fields. The scales shown on the illustrations indicate feet. On two of the dies, Figs. 2 and 3, the blanks produced by them are shown right over the punches. These dies were made by the Rudolph & Krummel Machine Works of 100 North Clinton street, Chicago.

Recent Business Mortality.

Dun's Review prints statistics of the failures during the first six months and comments on the tables as follows:

The first half of 1894 was in some respects the most trying the country has ever known. In number and in amount of liabilities the failures exhibit the effects of hope deferred, following hard upon the exhaustion of resources by the unprecedented prostration of 1893. There were more failures than in the first half of any other year, 7031, exclusive of banks and bankers and transportation companies, against 6401 in the first half of last year. The exclusively commercial liabilities were possibly surpassed last year, but not in the first half of any previous year. The amount was \$101,578,152, against \$168,864,444 last year, when reports included many banks, private bankers and financial corporations with their enormous liabilities. The only other year in which liabilities exceeded \$100,000,000 in the first half was 1884, when the amount reported was \$124,391,282, but at that time banking failures were so far included that in New York City alone the liabilities were \$57,611,038, and the liabilities in all other failures outside this city were but \$66,780,244. This year the commercial liabilities alone outside New York State have amounted to \$78,600,000.

The liabilities reported in New England and the Pacific States were larger than in the first half of 1893, and in the Southern States almost as large. But in the Central States the liabilities were not a third as large as last year, and in Western States and Territories only \$9,000,000, against \$31,000,000 last year. In the Southwest the amount was not quite half as large as last year, and in the Middle States about two thirds as large. The tremendous flood of liquidations which swept over the Western and Central States last year was largely due to values widely inflated by real estate speculation. But the commercial disasters caused by the weakening of firms last year, and the continued depression in trade and manufactures to this day, have been, on the whole, unsurpassed in any like period since the record of failures began.

No less than 1501 manufacturing concerns went down under the pressure, with liabilities amounting to \$41,376,102. It is encouraging that, during the second quarter, these failures were

fewer, and in liabilities less than half as large, as during the first quarter. Compared with last year, there would be no decrease had not the great liabilities of the cordage concern swelled the aggregate in 1893. Of trading con-

\$33,760,186 in the first quarter of the year. The failures of brokers and insurance and loan companies were 118, and the liabilities \$7,856,072, against about \$40,000,000 last year. The aggregate was \$5,589,057 for the second

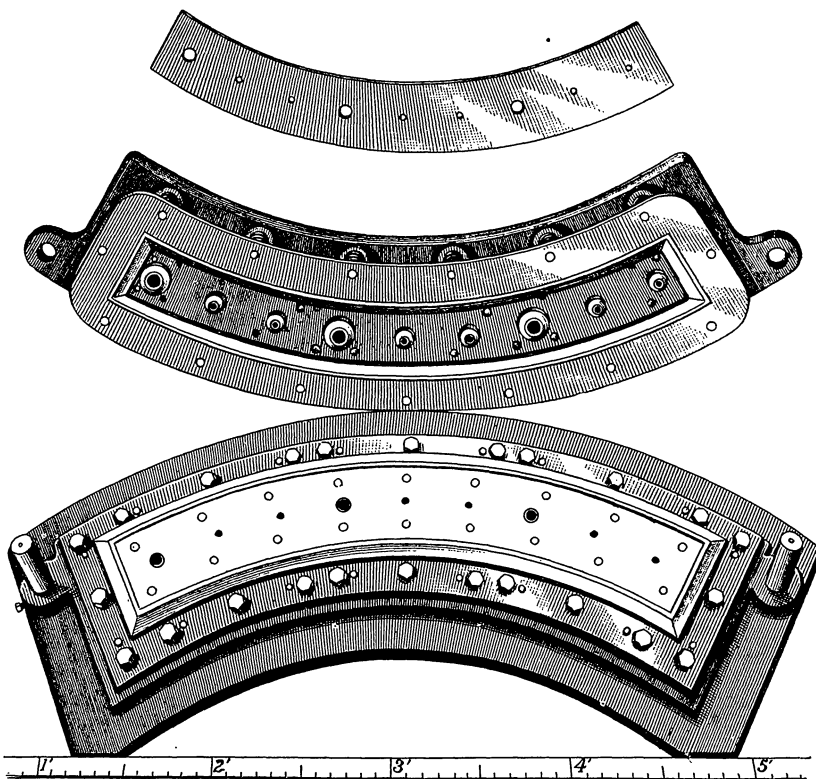


Fig. 2.—Die for Cutting Large Segmental Shapes.

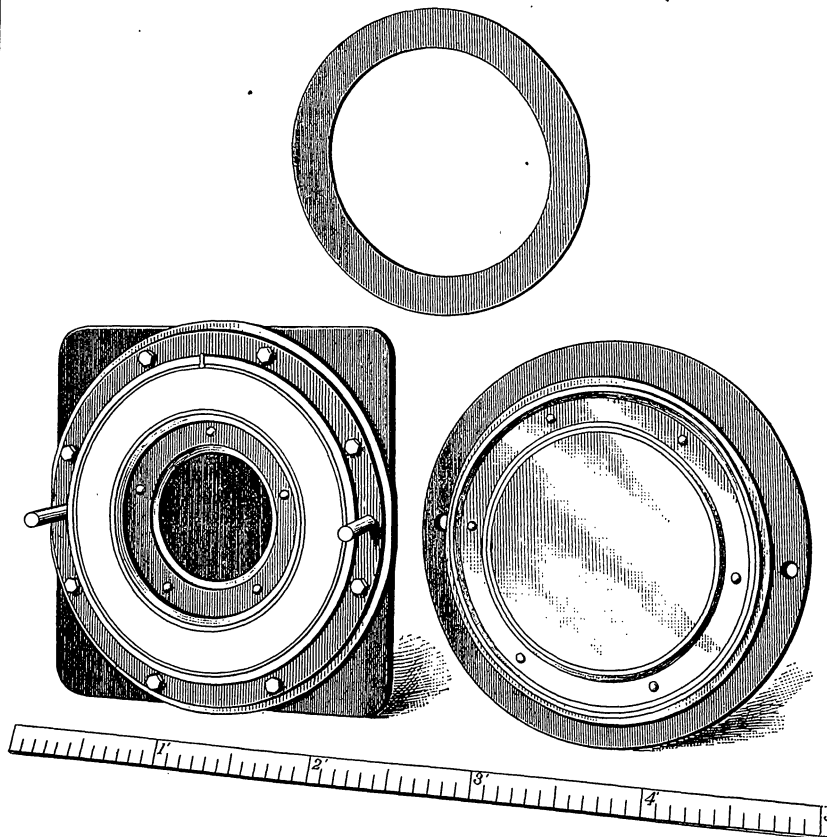


Fig. 3.—Die for Cutting Large Ring.

LARGE SHEET METAL CUTTING OR BLANKING DIES.

cerns, 5402 succumbed, but only 2068 in the second, against 3334 in the first quarter, and the liabilities were \$52,345,978, though the apparent amount of such liabilities, during the first half of last year, was only \$48,000,000. But in the second quarter of 1894 the amount was but \$18,563,374, against

quarter, against \$2,262,015 for the first quarter of the year.

Banking failures during the half year have numbered 63, with reported liabilities of \$13,184,461, and again the second quarter exceeds the first quite largely. Only three small railroads have been turned over to receivers dur-

ing the second quarter, making the number for the half year 17, with 2127 miles of road operated and 46,800,695 of indebtedness, and \$44,240,447 of stock outstanding. Thus, the liabilities of all firms and companies failing during the half year were \$101,578,152 commercial and \$59,975,156 railway and banking, against \$168,864,444, not including railroads nor all of the banking concerns, in the first half of last year.

The Foundrymen's Association.

The regular monthly meeting of the Foundrymen's Association was held at the Manufacturers' Club in Philadelphia on Thursday July 5, the vice-president, Thos. Devlin, presiding. The reading of the minutes of the last meeting was dispensed with, the same having appeared in *The Iron Age* of June 14.

The Executive Committee reported that they did not know of any decided change in the foundry business for the better or worse. The coal strikes seemed to be pretty well settled, but not entirely so; while some of the mines in the Connellsville region had been working for a day or two, the committee had been informed that there was a prospect of a further stoppage. In other words the working was irregular and, therefore, for a time there would be trouble in getting a good supply of soft coal and coke. It was understood, however, that Virginia coke and coal was coming through without much interruption. Since the last meeting of the association the tariff bill had been passed by the Senate and would proceed to the House and Conference Committee. It was impossible to tell what would be done with it. It was not thought to have had any effect on business generally since its passage in the Senate. The great Pullman boycott, accompanied by interferences and strikes over the Western roads, had had a bad effect on the business interests of the country. It was thought, however, that the matter had reached its limit and was being handled by the military. In regard to the foundry interest the committee could not see far enough into the future to tell what was going to happen. The common expression of opinion was that stocks were running short and would have to be replenished sooner or later. Foundrymen occupied the unpleasant position of living in hope. The committee presented for honorary membership in the association the names of W. J. Keep, superintendent of the Michigan Stove Company, Detroit, Mich., and of Thomas D. West of the Thos. D. West Foundry Company, Sharpsville, Pa., as a recognition of the valuable services and interesting papers which they had presented from time to time for the consideration of the association.

The treasurer reported a balance on hand of \$149.68.

The Price Committee then reported by sections.

Malleable and Small Gray Iron Castings.—For this section Stanley G. Flagg, Jr., reported that there had been no change in business since last reporting.

Sash Weights.—E. E. Brown reported that there had been no advance in prices in this line. Prices dropped a little, but got back to the figures in vogue at the time of making his last report.

Cast Iron Water and Gas Pipe.—P. D. Wanner for this section said that

there was nothing new to report. The trade was still large, but it was being supplied. Prices remained about the same. As to the position of the pipe men, he thought that if there should be a revival and they were able to make up during the latter half of the year what they had lost during the first they would do very well. He believed that to be the position of the pipe men throughout the country. This condition of the trade, however, did not prevent strikes. It was still thought that pipe men should pay bigger wages and furnish their pipe for less money. Time will tell what the rest of the year will bring forth.

Election of new members being next in order the rules governing elections were on motion suspended, and Messrs. Keep and West elected to honorary membership in the association.

A paper by W. J. Keep was then read by Mr. Flagg, as follows:

Foundry Use of Physical and Chemical Tests.

I began this discussion by saying that the only way to arrive at correct conclusions regarding cast iron was by means of properly conducted physical tests explained by chemical analysis; also, that the physical structure of cast iron is not wholly dependent on its chemical constitution; also, that a determination of shrinkage and chill would indicate when the correct percentage of silicon was present, and that the strength and deflection would tell if the mixture had been arranged to the best advantage. Some have objected to my methods, rather than defend their own side of the case by facts and figures.

Opposition to New Methods.—There are those who always oppose a new manner of arriving at conclusions. Not one of those who have raised objections has ever used or seen my apparatus or has seen one of my $\frac{1}{4}$ -inch test bars. A letter lately received speaks as follows: "The difficulty with the chemists, and with all who have not had practical experience with your admirable system, is that they are disqualified for an intelligent understanding of the question at all." It is easier to object and imagine difficulties than it is to present results of original research. My effort has been to find reasons for the behavior of cast iron, and to present them in such a manner that the founder who has not had the advantage of a chemical education can intelligently purchase and use iron.

The $\frac{1}{4}$ -inch Square Test Bar.—The explanation of the influence of the five metalloids in cast iron, which has been made during the last six years by a study of the $\frac{1}{4}$ -inch bar is all the defense that it needs. I gave a summary of these conclusions in my paper of April 4. It has been stated that "test bars to be trustworthy must be of a size to give approximately constant results." The truth is, test bars to be trustworthy must be of a size to show correctly the quality of the iron, and

cast iron always varies. I only recommend practice. The large amount of surface exposed to the mold makes a uniform grain throughout, and causes it to indicate the slightest change in composition.

General Application of the $\frac{1}{4}$ Inch Test Bar.—The behavior of this bar is the measure of the effect of silicon in a casting, whether large or small, just as a foot rule can measure a large or small object.

In *The Iron Age*, May 17, page 946, E. H. Mumford, with Henry R. Worthington, says: "It may be taken for a fact that no one size of test bar is better adapted to a certain class of work than another. The great truth in this matter of test bars is that whatever their shape, size or method of molding, they should always be made and tested in exactly the same way. Follow up Mr. Keep's system and you will get results like what follows:

"If a water cylinder 3 inches thick and weighing 8 tons gives a bar in 'Keep's test' that runs 450 in strength, 0.155 inch in shrinkage and 0.08 inch chill, you may be sure that the casting is free from shrinkage strains, will cut easily and is strong. If the same casting gives you a Keep bar that runs 350 in strength, 0.170 inch shrinkage and 0.25 inch chill, you may be sure that you have a casting that, while it looks close and strong, will take twice as long to machine, has put its thinner portions under immense initial stress, and is very likely, therefore, to show shrinkage cracks, as the iron has not the strength necessary to resist either these or its working bursting pressure in service afterward, certainly not both at once. All this the little $\frac{1}{4}$ inch bar tells you of the big casting, and it does it better than the larger bar would."

I am allowed to take the following from the books of one of our largest machine foundries: "By analysis, silicon 2.26, average chill of a Keep's bar 0.075, shrinkage 0.154, strength 436. Iron open and soft, perhaps our best iron for general work." Three per cent. or 3.25 per cent. silicon, and shrinkage 1.125, will make good stove plate, but a large machine casting must contain less silicon, which will be indicated by higher shrinkage.

Influence of Iron Standing in a Ladle.—I introduced in my last paper nine series of tests to indicate what could be shown by physical tests, and that chemical analysis could not do as much. I did not intend to turn the discussion in another direction. The 3.25 per cent. silicon iron, drawn from a cupola as fast as melted, produced stronger castings from the portion of iron which had been longest in the ladle. To get an explanation of the different experience of some who had observed an opposite effect, the experiment was tried at a prominent machine foundry in this city. The iron was for a 3-ton cylinder and was very dull. This is shown in Series X (continuing the numbers of my last paper).

Series X.

No. test.	28 pounds iron in one ladle. (Rested.)	Dead load.		Shrinkage.		Chill.
		Strength.	Deflection.	Square.	Flat.	
806	Poured at once.....	0.420	0.21	0.160	168	0.150
807	Poured $\frac{3}{4}$ minute later.....	0.474	0.34	0.162	.....	0.150
808	Poured $\frac{3}{4}$ minute later.....	0.438	0.22	0.160	.....	0.150

mend the $\frac{1}{4}$ inch test bar for iron that will run gray or nearly so in this size, and this covers nine-tenths of foundry

I also made a mixture of pig irons and scrap the same as in Series VII to IX, and melted it in a crucible. This is

shown in Nos. 803 to 805 of Series XI. I also melted one brand of pig iron in a crucible, as shown in numbers 833 to 836.

three to five test bars. (Series IV in my last paper is the test of the single bar of the set which was analyzed, while Series VII to IX show the averages of

silicon must vary with each variation in the size of the casting.

Table XIV.—An Approximate Key for Regulating Foundry Mixtures.

Size of the casting.	Silicon required in the casting.	Shrinkage of the casting.	Shrinkage of a 1/2 inch test bar.	Size of test bar, "Keep's Test."
Inches square.	Per cent.	Per foot.	Per foot.	Inch square.
1/2	3.25	0.125	0.125	1/2
1	2.75	0.125	0.135	1/2
2	2.25	0.125	0.145	1/2
3	1.75	0.125	0.155	1/2
4	1.25	0.125	0.165	1/2

But such a variation in silicon will cause a variation in the shrinkage of 1/2 inch test bar.

The table shows that a casting 1 inch square needs 2 75 per cent. of silicon to give it a shrinkage of 0.125, and that a 1/2 inch square test bar from the same

Series XI.

No. test.	28 pounds iron in one crucible. (Kested.)	Dead load.		Shrinkage.		Chill.
		Strength.	Deflection.	Square.	Flat.	
Mixture like Series VII to IX						
803	Poured at once	0.359	0.21	0.125	0.143	0.08
804	Poured 1¼ minutes later.....	0.372	0.21	0.13	0.145	0.12
805	Poured 1½ minutes later.	0.378	0.21	0.122	.....	0.06
One brand pig iron alone.						
833	Poured at once.....	0.402	0.26	0.158	0.159	0.17
834	Poured 1¼ minutes later.....	0.378	0.23	0.158	0.159	0.17
835	Poured 1½ minutes later.....	0.376	0.20	0.158	0.159	0.17
836	Poured 1¼ minutes later.....	0.368	0.17	0.157	0.158	0.17

Both these and the tests in my paper of April 4 show how iron behaved in each case, and taken together show that under different conditions different results may be obtained.

The Influence of Wet and Dry Molds.—As this question has been raised, "Keep's Test" can give the desired information. I have purposely gone to extremes. In 814 the mold was so wet that one bar was perfectly hollow from a blow hole. In the other wet molds the sand was as wet as possible to get sound castings. The dry molds were thoroughly dried. The regular mold was "tempered as for ordinary work, only rather dry" (Pamphlet "Keep's Test for Cast Iron," p. 7).

Series XII.

No. Test.	All three poured from one ladle.	Dead Load.		Shrinkage.		Chill.
		Strength.	Deflection.	Square.	Flat.	
814	Very wet mold.....	420	0.22	0.146	0.149	0.04
815	Regular mold.....	430	0.23	0.136	0.142	0.04
816	Dry mold.....	414	0.23	0.130	0.142	0.06
818	Wet mold.....	425	0.22	0.131	0.145	0.08
819	Regular mold.....	468	0.25	0.132	0.143	0.08
820	Dry mold.....	437	0.23	0.123	0.138	0.08
821	Wet mold.....	398	0.22	0.128	0.145	0.06
822	Regular mold.....	382	0.22	0.130	0.146	0.06
823	Dry mold.....	407	0.23	0.120	0.140	0.05
827	Wet mold.....	417	0.23	0.138	0.147	0.04
828	Regular mold.....	417	0.24	0.129	0.144	0.05
829	Dry mold.....	421	0.24	0.122	0.140	0.04
830	Wet mold.....	375	0.21	0.142	0.150	0.05
831	Regular mold.....	387	0.22	0.140	0.148	0.04
832	Dry mold.....	390	0.22	0.129	0.141	0.04

The Influence of Temperature of Cupola.—In the investigation of another subject the tests in Series XIII were made. Tests 812, 813, 824 and 825 were from the first iron that came down, which boiled on the cupola bottom on account of the moisture which it contained; 812 and 824 were caught in a freshly dried ladle and then changed to another fresh ladle, the iron boiling in both; 813 was caught in a red hot ladle, next after 812, and shows only the influence of the boiling on the cupola bottom; 825 was caught in the hot ladle after pouring 824, but 300 pounds of iron had been taken out between the catches and the iron had improved; 815 and 826 were from the middle of the heat and show average iron. Each of the tests in this paper were on different days, and are each averages of from

the three test bars of each set. This explains the difference in the figures.)

Series XIII.

No. Test.	Separate ladle for each test.	Dead load.		Shrinkage.		Chill.
		Strength.	Deflection.	Square.	Flat.	
812	First iron (after 200 pounds).....	0.392	0.21	0.163	0.187	0.225
813	First iron, next ladle.....	0.390	0.20	0.164	0.175	0.150
815	Middle of heat.....	0.430	0.23	0.136	0.142	0.040
817	Last of heat.....	0.397	0.21	0.132	0.148	0.075
824	First iron (after 300 pounds).....	0.375	0.19	0.162	0.186	0.225
825	First iron (after 600 pounds).....	0.415	0.21	0.163	0.167	0.100
826	Middle of heat.....	0.425	0.23	0.126	0.141	0.025

The object in producing these examples is not to present new questions for discussion, but to show that the physical quality of cast iron is not wholly dependent upon its chemical composition, and that "Keep's Test" will not only always show the proper amount of silicon, but will show the influence of every condition met in foundry practice. Allow me in closing to again quote Mr. Mumford: "There has never been, and there hardly ever can be, a system of foundry testing so complete and making it so certain that bars made now, or a

metal will show a shrinkage of 0.135; but that a casting 4 inches square, on account of its slow cooling, needs only 1 25 per cent. of silicon to produce the same grain and shrinkage. The 0.165 shrinkage of the 1/2 inch test bar shows that the iron will make a casting 4 inches square with a shrinkage of 0.125 and that it contains the correct amount of silicon.

The following experience, Series XV, during the present coal strike, is an illustration of the value of this relative test:

Series XV.

No. Test.	An entire change of iron mixture and coke in four days, good castings every day, 834 castings a little hard.	Dead load.		Shrinkage.		Chill.
		Strength	Def.	1/2 inch square.	Flat.	
837	Old iron mixed with Conn. coke.....	417	0.24	0.129	0.144	0.04
838	New iron mixed with Conn. coke.....	407	0.22	0.148	0.153	0.07
839	New iron mixed with Pocah. coke.....	377	0.19	0.158	0.160	0.09
840	New iron mixed with (silicon included) Pocah. coke.....	419	0.23	0.141	0.150	0.05
841	New iron mixed with (silicon included) Pocah. coke.....	423	0.23	0.131	0.146	0.09
842	New iron mixed with (silicon included) Pocah. coke.....	436	0.23	0.128	0.141	0.04

year from now, in one shop or another, shall be so absolutely alike as 'Keep's Mechanical Analysis.'"

Mr. Flagg also read the following additional paper by Mr. Keep:

A Key for Regulating Foundry Mixtures.

The composition of cast iron is so imperfectly understood, that few realize that there is a direct relation between the shrinkage of a 1/2 inch test bar and that of a casting. I will illustrate the truth of this by Table XIV (continuing the numbers of my last paper), the figures of which are mostly taken from actual tests, but any change in the iron composition or other conditions would vary the figures somewhat. To produce a uniform grain and a sound casting, and 1/2 inch shrinkage to the foot, the

The mixture 837 was perfectly satisfactory, but owing to a stoppage in shipments of pig iron, a new mixture, 838, was made. The shrinkage shows the need of more silicon, and this could have been corrected at once, but as it was necessary next day to change to a coke which was claimed to be purer, the iron mixture was not changed for 839. Next day the silicon of the mixture was increased in 840, and a continuance of another day (841) brought the iron back to be standard; 842 shows that silicon must be slightly decreased next day.

Foundry Routine.—Make only one flask containing a square and flat bar with yokes. Mark these 1 and grind them to use in measuring shrinkage. Rub off the fin turned by the emery wheel with an old file. Measure the

shrinkage of the bars in the same yokes in which they were cast and take average of one reading from each end. Be sure that the bars lie as they did on the follow board.

Make one other flask with only square bars, without yokes. These are also marked 1, and with the notches on the end of each bar they will be 1-1 and 1-2. If other flasks of square bars are made they will be 2-1, 2-2, &c.

Measure and record the size at the center of all square bars. The height is the distance from the side on which are the gate marks to the opposite side.

Bars are placed in the dead load machine with the gate marks down. Loosen clamp on the paper and push forward and back to draw a base line. Tighten the clamp, bring the weight to zero on the beam, press back the paper holder to take up any slack and move pencil up and down to mark the starting point. In breaking No. 1 bar run to 300, lift the pencil first upward against the paper to mark the 300 point and then pull away from the paper, and return the weight to zero, and run again to 300 and past it, watching the division on the beam to read the breaking weight. If the weight reaches 400 make a new spring line. With the other bars no spring line is necessary. When a bar breaks remove the paper and record the breaking weight and the number of the bar.

Split the end of No. 1 bar to determine chill.

Be governed by all suggestions in pamphlet, "Keep's Test for Cast Iron" and "Foundry Mixtures Controlled by a Mechanical Analysis."

A paper by Thomas D. West was next read by Mr. Stirling and was as follows:

Round vs. Square Test Bars.

In reading Mr. Keep's evasive reply to my paper read before this association May 2, 1894, we find him starting off with an alarm on "Opposition to New Methods." I fail to perceive where the new methods are. He uses the square bar, which has been the practice ever since founding tests have been made. He casts them flat, as always has been done, and has only got as far as to take note of contraction and chill, which by older men than I am can be shown to be a very ancient practice. The strength he obtains by the most unscientific form and size of test bar that could be devised. The contraction he obtains between fixed yokes which cannot permit of free expansion of the metal at the moment of solidification. The "chill" he obtains by a method that does not permit of close union of the test bar with the chill until all are cold to handle. My reason for condemning the square bar was fully illustrated in a paper I presented to the Western Association June 20, 1894, and I now have about completed another paper in which I shall prove that the manner in which Mr. Keep obtains his contraction and chill are wrong. I will also show in this same paper methods for casting test bars which I will challenge Mr. Keep to prove are not original in the strictest sense. I will also prove to Mr. Keep that contraction and shrinkage are two distinct factors and that one can be defined and measured as well as the other, and again I shall define the degree of fluidity at which the test bars are poured. These are new features never before to my knowledge recorded or taken note of. We all now know that the fluidity is an important element affecting strength and should be re-

corded as far as practicable. The plan which I shall present to the association to pass upon is such that any one can by means of one round test bar record the transverse and tensile strength, contraction, shrinkage, chill and fluidity of the metal that comprises the test bar.

Returning to Mr. Keep's paper, we find in the sixth paragraph he says: "I only recommend the $\frac{1}{2}$ inch test bar for iron that will run gray or nearly so, and this covers nine-tenths of foundry practice." Mr. Keep's admission that his system is good only for an iron that will run gray or nearly so in a $\frac{1}{2}$ inch test bar means that it is only good for soft work, and that if by any bad management, fuel or iron a soft work heat should run hard it would not be reliable to test the strength. I know Mr. Keep could retort by saying it would test the contraction and chill, and that would be a good guide in showing how far he was off. Admitting for argument that his test is all right in this respect, it does not follow that only by Keep's $\frac{1}{2}$ inch test bar is such to be practically told, for he has in a later article, which the secretary now holds, unintentionally proved by his own figures and experiments that we can be guided by any size of a test bar, and that it makes no difference whether it is $\frac{1}{2}$ inch or 4 inches square, which we might adopt as a guide to test the contraction or chill.

In Mr. Keep's fifteenth paragraph he has evidently expended much time and labor in experimenting to find the influence of wet and dry molds. This was brought about, no doubt, by Mr. Fry's criticism on his system. The result was that a batch of test bars, among which there was one with a big blow hole, due to a very wet mold, showed a strength within 10 pounds of the strongest test in the four series of wet and dry sand mold experiments.

Taking Mr. Keep's late assertion that his system is only good for iron that will run gray or nearly so in a $\frac{1}{2}$ inch test bar, and contrasting it with that which prefaces his "Keep's Test for Cast Iron," in which he says, "The object of this paper is to advocate a standard test for cast iron such that all tests may be compared with each other," certainly looks like "a very bad drop." Taking the above in connection with the fact of our hearing no more about "Keep's impact tests," it is fair to conclude that the shots which are being fired by opponents are very effective and that we may soon expect an unconditional surrender of the $\frac{1}{2}$ -inch square test bar as a valuable relative test for any kind of cast iron.

Some little discussion then ensued in which Messrs. Bancroft, Flagg, Wanner, Evans, Rankin, Devlin and Hibbs took part.

Secretary Evans next read a notice of a motion to be made at the next meeting of the association, amending articles of the by-laws.

He then announced that Malcolm McDowell of Chicago, the proprietor of an article known as "McDowell's Alloy for Improving Cast Iron," was present that evening, and had come prepared with a paper on

"Chemistry in Foundry Practice."

The paper read as follows:

Questions of great interest are those bearing on carbon's relation to iron and how it is affected by silicon, manganese, phosphorus and sulphur; how these are affected when combined with iron; how carbon is influenced by heat in connection with calcium, sodium,

chlorine and fluorine; what combinations if desirable can be made to advantage by the introduction of chrome, copper, nickel, zinc, tungsten and aluminum as alloys, in some cases as a substitute for carbon, and in others to intensify its action.

I commenced by puddling iron for a base for making steel and then followed the manufacture of it with a variety of mechanical devices and some chemical knowledge, and in all this ascertained some truths which are of value in ordinary foundry practice. These I have applied and I have succeeded in making, with the ordinary foundry coke pig of the South as a base in the ordinary cupola, a metal whose tensile strength runs from 32 000 to 40,000 pounds to the square inch—a perfectly sound, solid, homogeneous metal of great density, easily machined, and taking a high polish in finishing. The metal can be made to stand the pressure of from 300 to 500 pounds per square inch of ammonia and air. It also resists the action of acid.

It is desirable to know the chemical constituents of the pig iron and scrap one may have, out of which a definite quality of casting is to be made. In making up a heat, the total quantity of each ingredient that goes into the cupola should be known, so that your charge sheet will show what percentage of carbon, silicon, manganese, phosphorus and sulphur was charged, and then an analysis of the casting made, showing what gain or loss was sustained in the melt.

From each heat made I have always taken the following kinds of test bars: Four bars 1-inch square, 14 inches long, with center points 12 inches apart. These are to test the transverse strength and elasticity, also the amount of contraction in 12 inches; two pieces 2 inches wide and 16 inches long, 4 inches of which are $\frac{1}{2}$ inch thick, 4 inches $\frac{1}{4}$ inch and 4 inches $\frac{3}{4}$ inch thick, and the remaining 4 inches running to a feather edge. These pieces are to show the fluidity of the metal. Two round bars 12 inches long, 4 inches on each end $1\frac{1}{4}$ inches diameter, 4 inches in the center 1 inch diameter; two round bars 12 inches long, 4 inches on each end $1\frac{1}{4}$ inches diameter, 4 inches in the center $1\frac{1}{4}$ inches diameter. These bars are to have their ends trimmed down to $1\frac{1}{4}$ inches diameter, and the ones that are $1\frac{1}{4}$ inches diameter in the center to be trimmed down to 1 inch diameter, testing the tensile strength with and without the outer skin. Two pieces 4 x 6 x 1 inch cast against a chill. These blocks when broken show the texture of the metal and its tendency to chill.

These test bars should have the same numbers as the heat they represent, and be tested as to their transverse and tensile strength, contraction and chilling tendencies, together with the nature of the fracture. All should be recorded so as to show by these tests the value of their chemical mixture, which of the different metals and metalloids are desirable, and in what proportion for special purposes. In time one will have arranged a series of tests showing at a glance which of the many kinds of pig they may have on hand is desirable for some specific purpose.

A vote of thanks was then tendered to Mr. McDowell, Mr. Keep and Mr. West for their papers.

Secretary Evans announced a question to which an answer was desired. It was, "What is the best lining for a cupola, and how should it be applied?" Mr. Brown said he had been using stone

for a year or more, and it had given very good satisfaction. Its cheapness was another leading virtue. It cost, he said, delivered, something less than \$2 per ton. He believed it was a silicon stone. It broke very easily, and was put in the cupola with fire clay. It was usually put in $\frac{1}{4}$ inch to $\frac{1}{2}$ inch thick. Coke was the fuel used for melting. Mr. Evans explained that it was a soft silica stone—a rotten rock—obtained near Glenside, Pa. It was used, he said, largely for lining up Bessemer converters, and was in use at Bethlehem, Scranton, and other places. He had never heard of its use in cupola work. As far as he had learned, nothing yet had proved entirely satisfactory for lining a cupola. The best lining ever made would wear out, and quickly, 14 to 18 months being the longest period he had heard of, and then it would be patched at the melting point. Mr. Flagg mentioned a lining he had seen in Mr. Keep's foundry, which, he had been informed, had lasted two years.

The meeting then adjourned to the roof garden of the club, where refreshments were served and a pleasant hour spent.

The Practical Prevention of Smoke in Boiler Firing by the Use of Producer Gas *

BY W. H. BLAUVELT.

Steam power has grown to be such an important factor in the needs of our daily lives, that the number of boilers used has multiplied enormously even during the past decade. Perhaps the increase has been most rapid in the large business blocks, hotels and similar places located in the most crowded parts of our cities. This fact has done a great deal to force the attention of the public to the subject of smoke and its prevention; for, unlike the manufactories and mills, which are usually located on the outskirts of the town, these boilers belch forth their black clouds in its very midst.

While it is very desirable that the firing of boilers should be smokeless, it is at the same time important that it should be economical, as smoke preventing devices will receive scant encouragement from those who are to use them if they entail increased expense for fuel or attendance: and, in fact, it is the economy of any proposed method that will alone determine its acceptance by the steam user. We have then, in considering the use of producer gas for firing boilers, to first discuss the question of its economy in comparison with the ordinary methods of firing; and, second, whether the prevention of smoke can be accomplished by its adoption.

First, as to economy. It is often said that the losses incident to gasification are so great that gas can never be an economical fuel for this work, that the heat generated in burning the carbon to carbon monoxide is lost in the producer, and that regeneration cannot be used to repay these losses, as is done in the regenerative furnaces for steel making, &c. While these statements may have been true with the earlier types of producers and in former practice they no longer obtain with present methods. Let us see what the losses actually are, and whether there are any corresponding ones in direct firing that will balance them. For this purpose let us assume the gasification in

a producer of the most modern type of a coal containing, say, 55 per cent. of fixed carbon, 32 per cent. of hydrocarbons and 13 per cent. of water and ash.

In all modern practice steam is mingled with the air used for blowing the producer, the principal object being to absorb the heat of primary combustion (burning carbon to carbon monoxide), which dissociates the steam, the hydrogen being set free and the oxygen combining with carbon to form carbon monoxide. A secondary object is the softening and breaking up of the clinkers formed. It is found that somewhat less than 8 per cent. of steam, by weight, is about the maximum amount practicable; in this mixture one-fourth of the oxygen needed for the combustion in the producer is supplied by the steam, the other three-fourths coming from the air. Assuming that 11 per cent. of the fixed carbon is burned to carbon dioxide, and that the above mixture of steam and air is used for blowing the producer, 1 pound of the above coal will give the following gas:

Pounds gas.	Heat developed.	Heat absorbed.
	British thermal units.	
0.05 pound carbon burned to CO ₂ ..	0.183	725
0.5 pound carbon burned to CO	1.167	2,200
Total		2,925
0.32 pound hydrocarbons, (distilled)* ..	0.320	....
0.88 pound oxygen needed, of which 0.2 pound derived from H ₂ O liberates H	0.025	1,550
0.60 pound oxygen derived from air is associated with N. 2.007	2.007	....
Total pounds gas from 1 pound coal	3.762	raised to 600 F. 540
Total		2,090

* In this discussion the hydrocarbons are assumed to be methane (CH₄).

The total energy in 1 pound of the above coal is 14,375 B. T. U. The difference between the heat developed and the heat absorbed (the loss by radiation, &c.) is 2925 — 2090 B. T. U. = 835 B. T. U. = 5.8 per cent. of the total energy of the coal. This estimate of loss is practically the same as that made by Taylor and Campbell in their discussions of heat reactions in the producer ("Transactions" A. I. M. E., vols. xviii and xxii). The energy expended in blowing the producer amounts to about 2 per cent. of the energy in the coal gasified. Thus, with the most economical producer practice the gas enters the flue with a loss of 7.8 per cent. charged against it. In a plant for firing boilers the producer should be as near as possible to the combustion chamber, and the additional radiation in this short flue would be hardly anything. If the gas lost 25° in temperature, it would amount to 0.2 per cent., making the total loss due to the gasification 8 per cent. In this estimate I have not considered the losses common to grate flues and producers, such as the carbon and sensible heat lost in the ashes, the heat expended in volatilizing the hydrocarbons, &c.

Now let us consider what are the relative values of the gaseous and solid fuels in the combustion chamber of the boiler. It is well known that gas can be burned with practically no more than the theoretical amount of air, if care is taken to mix them intimately. But it is shown by Rankine and others that at least twice the theoretical quantity of air is necessary to properly burn solid fuel, in order to provide for the proper dilution

of the gases of combustion, which would otherwise prevent the free access of air to the fuel. Much more than this excess is actually used in practice, especially when we consider the enormous quantities of air that enter the doors during the operations of stoking and cleaning the fire. But for this comparison we will accept Rankine's figures, 24 pounds of air to 1 pound of coal.

To burn the gas from 1 pound of coal (assuming it to be of the composition given in the above table), 9.3 pounds of air are needed. Assuming for simplicity's sake (and as this factor has no bearing on the case) that the walls of the furnace radiate no heat, all the heat generated is absorbed by the boiler, except that escaping up the stack in the waste gases, which we will assume have the moderate temperature of 600° F. It will at once be seen that the loss from this cause is much greater in the case of the solid fuel, owing to the greater volume of the gases. The amount of the loss is shown below.

When gaseous fuel is burned, the gas enters the combustion chamber at 600° F., as before shown, and the air at an average of say 50°. Therefore the total loss of heat in the combustion under a boiler of the gas from 1 pound of coal is that absorbed in raising the 9.3 pounds of air from 50° to 600°, the temperature of the stack gases. This loss amounts to 1279 B. T. U., or 8.8 per cent. of the total energy of the coal. Adding this to the loss in the producer and flue gives 16.8 per cent. as the total loss under the assumed conditions.

In the case of the solid fuel, both coal and air enter the combustion chamber at the temperature of the atmosphere, which has been assumed to be 50°. We have, therefore, 24.87 pounds of waste gases to be raised 550°. (No account has been made of the moisture in the coal in either case, as its action is the same in both). This absorbs 3420 B. T. U., or 23.8 per cent. of the total energy in the coal. The loss is, therefore, 7 per cent. greater by the use of solid fuel than when gas is the fuel. Or, 11,960 B. T. U. are available for work in a pound of coal, when burned as gas, and 10,953 B. T. U. when it is used direct. The gas would, therefore, do 9.2 per cent. more work than the solid fuel. These figures show only the losses essential to the two methods and which no care in manipulation can overcome. In practice there are other losses, such as that of carbon falling through the grate and the escape of unconsumed gases; these losses are always much greater in grate fires than in well conducted plants. The great variations in a grate fire in the proportions of air and combustible as fresh fuel is thrown on and then burns down to bright coals is a serious cause of loss that is entirely lacking in the gas fire which is properly handled.

That the results of practical tests comparing gas with direct firing vary greatly, often showing much larger and sometimes even less economy in favor of the gas than that shown above, is due to the relative approximations made to the above examples, which are of the best attainable practice. When hand fired boilers are badly managed the economy obtained from gas, properly applied, is very large, sometimes as high as 30 to 35 per cent. On the contrary, when gas is carelessly and incorrectly applied to boilers previously fired by hand in the best manner, it may be that no saving will be effected.

The above calculation has shown what a large amount of heat is lost in the chimney gases, even when they es-

* A paper read before the Engineers' Society of Western Pennsylvania.

cape at no higher temperature than 600 F.^o Gas fuel readily enables a portion of this heat to be returned to the combustion chamber by using the waste gases to preheat the air for combustion. The temperature to which the air can be raised depends upon the opportunity the arrangement of the plant affords for introducing an efficient heating apparatus. But in the case above assumed, if the incoming air could be heated to 325° (which could readily be done) one-half of the chimney loss, or 4.4 per cent. of the total energy in the coal burned as gas, would be saved, and the total loss reduced to 12.4 per cent., against 23.8 per cent. loss with the solid fuel.

Not the least among the advantages of gaseous fuel is the unquestionable fact that by its use it is much easier to maintain a maximum of economy, and the personal feelings of the firemen do not introduce so large a variable into the problem as in the ordinary method of hand firing. Therefore, gas fired boilers usually give a much greater saving over those fired with coal than is shown in the above comparison. Tests made at various times and with widely different fuels show economies varying from 10 to 30 per cent. and, in almost all cases, a materially increased rate of evaporation is obtained. Another important advantage is that the steaming is much more regular, especially when the plant is large. Then all the producers feed into a common gas main, and this supplies all the boilers, so there is practically no variation in the supply of gas. The life of the boiler is materially greater with the gaseous fuel, as it is free from the strains caused by the frequent cooling due to the enormous quantities of cold air that rush in whenever the fire doors are open for the stoking and cleaning necessary when burning solid fuel. Just to what extent these strains shorten the life of a boiler it is impossible to estimate, but it is acknowledged that their effect is serious.

On the other side, the solid fuel has the advantage of the radiant heat of the bed of coals as it glows on the grate after being fully coked. Just what this amounts to is not known, nor have we been able to measure its evaporative value. It is undoubtedly true that more evaporation per square foot of surface can be obtained by a coal fire when there is a sufficiently strong draft than by gas, but only at a largely increased expenditure of coal, in proportion to the duty done. Notwithstanding the undetermined value of the radiant heat from the solid fuel, numerous practical tests show the economy to be in favor of the gas, and this is a proof much more satisfactory to the steam user than the most elaborate and convincing calculations on thermal energy and absorption. As a result of our investigation into the economy of the subject we find, therefore, that the advantages are on the side of the gaseous fuel for firing boilers. Its use secures more duty per pound of coal, insures a higher average of good work, more regular steaming and the life of the boiler is materially prolonged.

Turning now to the other branch of our subject, our first inquiry is, what is smoke, and how is it formed? Although smoke in general may be composed of a large number of gases, vapors and finely divided solids, we are considering only the smoke from bituminous coal; this may be defined as that portion of the products of combustion of the hydrocarbons in the coal which is visible—viz., solid carbon in a finely divided state, or soot, and volatilized but unburnt hydrocarbons.

Many hydrocarbons, when heated to suitable temperatures, are decomposed with formation of a new hydrocarbon and solid carbon in a fine state, which, unless there is present a supply of air at a proper temperature for its combustion, passes off as soot. Smoke may also be formed by hydrocarbons while in combustion striking against a cool surface, which lowers the temperature below that at which combustion can be sustained, and the flame is "put out," with the production of smoke as the result.

A third cause is the distillation of the hydrocarbons without alteration or even partial combustion. It is this that gives the yellow tinge to smoke, and the greasy quality, which is one of its most disagreeable features. From the point of view of thermal economics, the formation of smoke is not of such serious importance as many imagine. In ordinary cases the actual loss of combustible amounts to but a few per cent. of the energy in the coal; in its denser forms it is important because it is the indicator of seriously imperfect combustion, and because carbon is visibly wasted. The attempt should be, therefore, to prevent its formation rather than to "consume" it, at the expenditure of mechanical or thermal energy.

The causes for the formation of smoke serve to indicate the means for its prevention. The deposition of solid carbon from decomposed hydrocarbons and the escape of unburnt volatilized hydrocarbons may both be prevented by their intimate mixture at the moment of combustion with the proper amount of air, preferably preheated, so that each particle of carbon or hydrocarbon may find oxygen adjacent to it for its combustion. The "putting out" of the flame by its contact with cold surfaces may only be overcome by permitting the combustion to be nearly complete or at least thoroughly established before the gases are allowed to impinge upon the boiler shell or other cool surface. While it is very difficult to carry out these conditions with solid fuel, gas easily lends itself to them, and by their proper application all smoke can be prevented from gas fired boilers. The mistake usually made in applying gas to boilers is the attempt to imitate the conditions of a solid coal fire, it being forgotten that the gas is employed in order to overcome weak points essential to the use of solid fuel.

In some applications of gas recently made to return tubular boilers by the writer, a careful use of the above principles in the light of previous less successful experience resulted in the prevention of all smoke and in an increase of the evaporative capacity of the boilers of over 12 per cent. as compared with the results from the same coal burned on the grate. At the same time there was a saving of about 15 per cent. in the amount of coal used. The air for combustion was not preheated, and the temperature of the waste gases was 700° or more, as the boilers were too short for the most economical work. Had hot air been used, of course, this high stack temperature would not have been a source of serious loss. The mixture of the gas and air was made as prompt and perfect as possible by a special arrangement of the ports, and inflammation was thoroughly developed in a brick chamber below the boilers. This was so arranged that but little more than the products of combustion reached the shell of the boiler, and at the same time the temperature at which combustion took place was kept high by the reflected and radiated heat from the

walls of the chamber. For successful boiler firing it is essential that the mixture of gas and air should take place as soon as possible after they enter the combustion chamber. Frequently they are introduced in parallel streams, but even if these streams are small, the gas and air often travel quite a distance with but little mingling of the currents. This is an important point.

The arrangement referred to above provoked some criticism from onlookers, as the fire seemed too far from the boiler to those whose idea was that the conditions of a coal fire should be imitated as closely as possible. But the entire absence of smoke and the duty obtained from the coal, both as to economy and rate of evaporation, were sufficient arguments in proof of the correctness of the principle employed. One point noted during this test was that it was practically impossible for the firemen to make smoke except by the most gross inattention to the relative proportions of air and gas.

I know of no other method of burning fuel which presents so practical and reliable a solution of the smoke problem; for it not only makes no smoke when carefully operated, but is equally free from that fault when the fireman's vigilance is relaxed, and it adds to this the advantage of economy over the methods in general use. To make gas available for the steam plants in the business parts of our cities a special producer would, in many instances, be required of a design suited to the limited quarters it would have to occupy, but this would hardly be a serious obstacle. Smoke abatement in cities is occupying so much public attention that stringent legislation on the subject is sure to come, and much annoyance and loss to steam users may be avoided by putting themselves beyond liability while there is ample time to make the change.

The new Anglo American cable now being laid between St. John's, Newfoundland, and Ireland, is the largest in the world.

American Tin Plate List.

With the object of furnishing to the tin plate trade and to consumers of tin andterne plates generally the latest information in regard to the products of the domestic manufacturers, *The Metal Worker* has compiled a comprehensive list of American tin plate makers and the names of their brands of tin andterne plates, together with an alphabetical list of the latter. The list may be claimed to be as accurate and complete as it is possible to obtain, being based on returns received direct from the makers within the last two weeks. Only such brands are included as are at present actually on the market. The tables will, therefore, be found very valuable for reference. Brands of domestic tin andterne plates have increased and multiplied so luxuriantly during the past two years that it has become an utter impossibility for any one to maintain an acquaintance with the mass of new names without such a guide as the list presented. The details given as to the number of tinning sets possessed and in operation, although not entirely complete in regard to the latter subject—a few manufacturers having declined to furnish this information—will be found useful as affording an approximate idea of the capacity of the various works. The increasing number of concerns rolling their own black sheets will be noted as an encouraging feature of the domestic tin plate situation.

Alphabetical List of Brands of American Tin and Terne Plates

BRIGHT CHARCOAL PLATES.

Name of Brand.	Maker.
Arlington	American Tin & Terne Plate Co.
Arrow	H. W. Scattergood.
Black Diamond	H. W. Scattergood.
Brilliant	N. & G. Taylor Co.
Buckeye	Cleveland Tin Plate Co.
Century	Phillips Tin Plate Co.
Cherokee	Philadelphia Iron & Tin Plate Works.
Climax	Gummey, Sperring & Co.
Colonial	Gummey, Sperring & Co.
Earnest	Norristown Tin Plate Co.
Elgin	Chicago Tin Plate Mfg. Co.
Elwood	American Tin Plate Co.
Erie	Chicago Tin Plate Mfg. Co.
Excelsior	Meurer Bros. Co.
Extra Buckeye	Cleveland Tin Plate Co.
Florence	Merchant & Co., Incorp'd.
Florida	Meurer Bros. Co.
Franklin	American Tin & Terne Plate Co.
Granite	St. Louis Stamping Co.
H. & P. Best Bright	Philadelphia Iron & Tin Plate Works.
Horse Shoe	H. W. Scattergood.
Imperial	H. W. Scattergood.
Irontdale	Wallace, Banfield & Co., Ltd.
Ivy	John Hamilton.
Linden	N. & G. Taylor Co.
Mars	Gummey, Sperring & Co.
Merion	N. & G. Taylor Co.
Minerva	Merchant & Co., Incorp'd.
Mohawk	Philadelphia Iron & Tin Plate Works.
New Castle Palm	
New Castle Best Palm	New Castle Tin Plate Co.
New Castle Charcoal	
New Castle S. Charcoal	
Neptune	Gummey, Sperring & Co.
Oak	Phillips Tin Plate Co.
Palma	Merchant & Co., Incorp'd.
Peerless	H. W. Scattergood.
Penn Treaty	Marshall Bros. & Co.
Phoenix	Gummey, Sperring & Co.
Pisa	Merchant & Co., Incorp'd.
Ploroma	John Hamilton.
Primrose	Griffiths & Cadwallader.
Quaker City	H. W. Scattergood.
Record A1	Record Mfg. Co.
Record A	Record Mfg. Co.
R. H. J.	Morewood Co.
Royal	N. & G. Taylor Co.
Seminole	Philadelphia Iron & Tin Plate Works.
Somerbrook	Somerton Tin Plate Works.
Somerton	Somerton Tin Plate Works.
Stag	Gummey, Sperring & Co.
St. Louis	St. Louis Stamping Co.
Sun	Gummey, Sperring & Co.
U. S. Bright	U. S. Iron & Tin Plate Mfg. Co.
Versailles	U. S. Iron & Tin Plate Mfg. Co.
Victor	Gummey, Sperring & Co.
Youghiogheny	U. S. Iron & Tin Plate Mfg. Co.

BRIGHT COKE PLATES.

Almond	N. & G. Taylor Co.
Brooklyn	Meurer Bros. Co.
B D	H. W. Scattergood.
C. T. P.	Cleveland Tin Plate Co.
Elwood Coke	American Tin Plate Co.
Flag	Canonsburg Iron & Steel Co.
Gladys	Phillips Tin Plate Co.
Irontdale	Wallace, Banfield & Co., Ltd.
Leslie	Merchant & Co., Incorp'd.
Leeds	American Tin Plate Co.
Locust	N. & G. Taylor Co.
Locust	Baltimore Steel, Iron & Tin Plate Co.
Mint	N. & G. Taylor Co.
New Castle Palm	New Castle Tin Plate Co.
Norristown	Norristown Tin Plate Co.

N

N	Chicago Tin Plate Mfg. Co.
Pausy	John Hamilton.
Petunia	Griffiths & Cadwallader.
Record Coke ..	Record Mfg. Co.
Steel Coke.....	St. Louis Stamping Co.
Walnut	Phillips Tin Plate Co.

TERNE PLATES.

Acme	St. Louis Stamping Co.
Alaska	Merchant & Co., Incorp'd.
Alderly	Gummey, Sperring & Co.
Allegheny	Laufman Tin Plate Co.
Alta	St. Louis Stamping Co.
Amber	Pittsburgh Tin Plate Works.
Anchor	Gummey, Sperring & Co.
Apollo Best Roofing	Apollo Iron & Steel Co.
Arch	Merchant & Co., Incorp'd.
Arrow	H. W. Scattergood.
Black Diamond	H. W. Scattergood.
Bonus	John Hamilton.
Boston	Phillips Tin Plate Co.
Buckeye	Cleveland Tin Plate Co.
Central	A. A. Thomson & Co.
Climax	Gummey, Sperring & Co.
Columbia	N. & G. Taylor Co.
Columbus	Phillips Tin Plate Co.
Crescent	Merchant & Co., Incorp'd.
C. T. P.	Cleveland Tin Plate Co.
Dawn	Canonsburg Iron & Steel Co.
Delaware Roofing	Philadelphia Iron & Tin Plate Works.
Eagle	Gummey, Sperring & Co.
Earnest	Norristown Tin Plate Co.
Elwood Terne	American Tin Plate Co.
Elziver	Philadelphia Tin Plate Co.
Empire	Merchant & Co., Incorp'd.
Enid	Philadelphia Tin Plate Co.
Extra Erie	Chicago Tin Plate Mfg. Co.
Extra Fine	St. Louis Stamping Co.
First New York	East River Lead Co.
Flag	Gummey, Sperring & Co.
Flushing	Meurer Bros. Co.
Freepoint	Laufman Tin Plate Co.
F. W. B.	Morewood Co.

Genuine Old Style	N. & G. Taylor Co.
Girard	Marshall Bros. & Co.
Glenwood	Griffiths & Cadwallader.
Globe	N. & G. Taylor Co.
Hamilton's Best Reddipped	John Hamilton.
Hancock	American Tin & Terne Plate Co.
Hand Coated	Merchant & Co., Incorp'd.
Hazlewood	John Hamilton.
H. & P. Best Roofing	Philadelphia Iron & Tin Plate Works.
H. & P. Redipped Roofing	Philadelphia Iron & Tin Plate Works.
H. C. B.	Morewood Co.
Hercules	Gummey, Sperring & Co.
Hickory	Merchant & Co., Incorp'd.
Horse Shoe	H. W. Scattergood.
Huron Roofing	Philadelphia Iron & Tin Plate Works.
Indiana	American Tin Plate Co.
Iron City	Duquesne Tin Plate Works.
Irontdale	Wallace, Banfield & Co., Ltd.
Irving	American Tin & Terne Plate Co.

J

J	Chicago Tin Plate Mfg. Co.
J. H. R.	Morewood Co.
Junata	East River Lead Co.
Juniati	New Castle Tin Plate Co.
Juno	George W. Jaques.
J. no.	Pittsburgh Tin Plate Works.
Kensington	Pittsburgh Tin Plate Works.
Keystone	American Tin & Terne Plate Co.
Keystone Hand Dipped.	American Tin & Terne Plate Co.
Kilbuck	John Hamilton.
Knoxall	N. & G. Taylor Co.
Laufman's Apollo.	Laufman Tin Plate Co.
Laufman's Roofing Tin.	P. H. Laufman & Co., Ltd.
Laurel	H. W. Scattergood.
Leomister.	Gummey, Sperring & Co.
Liberty	Gummey, Sperring & Co.
Lulu.	John Hamilton.
Maple	N. & G. Taylor Co.
Marshall	Marshall Bros. Co.
M. C. B.	Marshall Bros. Co.
Merchant's Old Method.	Merchant & Co., Incorp'd.
Merchant's Roofing	Merchant & Co., Incorp'd.
Meurer's Roofing	Meurer Bros. Co.
Mingo Old Process.	John Hamilton.
Mohawk	East River Lead Co.
National	Phillips Tin Plate Co.
Neville	James B. Scott & Co.
New Castle Old Method.	New Castle Tin Plate Co.
New Castle Palm.	New Castle Tin Plate Co.
New Process.	George W. Jaques.
Norristown Extra.	Norristown Tin Plate Co.
Norristown Redipped	Norristown Tin Plate Co.
Old Colony	A. A. Thomson & Co.
Old Method	N. & G. Taylor Co.
Oneida Roofing	Philadelphia Iron & Tin Plate Works
Oseola Old Style	John Hamilton.
Palm	Merchant & Co., Incorp'd.
Pennsylv Old Method.	Gummey, Sperring & Co.
Penn Treaty	Marshall Bros. & Co.
Phillips' Roofing.	Phillips' Tin Plate Co.
Phoenix.	Gummey, Sperring & Co.
Pioneer.	Gummey, Sperring & Co.
Piqua	Cincinnati Corrugating Co.
Piqua Triple Coated.	Cincinnati Corrugating Co.
P. T. L.	Morewood Co.
Pullman	Meurer Bros Co.
Puritan	American Tin & Terne Plate Co.
Quaker City.	H. W. Scattergood.
Republic.	Phillips' Tin Plate Co.
Scott's Extra Coated	Jas. B. Scott & Co.
S. G.	St. Louis Stamping Co.
Sharon	Philadelphia Tin Plate Co.
S L S Old Process	St. Louis Stamping Co.
Snowdrop	Saunders, Fielding & Bond.
Special Extra Coated.	Merchant & Co., Incorp'd.
Spruce	N. & G. Taylor Co.
Stanley	Meurer Bros Co.
Superior	Meurer Bros Co.
Taylor Roofing Tin	N. & G. Taylor Co.
Thomson's Puritan.	A. A. Thomson & Co.
Tip Top	Laufman Tin Plate Co.
Triumph	Philadelphia Tin Plate Co.
Trotter's American New Method.	Philadelphia Tin Plate Co.
Trotter's Roofing	Philadelphia Tin Plate Co.
U. S. Eagle	United States Iron & Tin Plate Mfg. Co.
U. S. Grant	
U. S. Monongahela.	
U. S. Redipped	
Venus	Gummey, Sperring & Co.
Waldo	Phillips Tin Plate Co.
Westmoreland	Pittsburgh Tin Plate Works.
Willow	N. & G. Taylor Co.
Zero	Phillips Tin Plate Co.

Dealers' Special Brands.

BRIGHT CHARCOAL PLATES.

Name of brand.	Dealer's name and address.
C. S. R. Co. Home	Canton Steel Roofing Co., Canton, Ohio.
C. S. R. Co., Tower	
C. S. R. Co., Yale	
Iona	Mortimer H. Cort, New York.
TERNE PLATES.	
Atlantic	Mortimer H. Cort, New York.
Dane	
De Milt's First New York	H. R. de Milt & Co., New York.
De Milt's First New Jersey	
De Milt's Mohawk	John Dunlap Co., Pittsburgh Pa.
Dunlap's Double Dipped	
Dunlap's Domestic	C. Sidney Shepard & Co., Chicago.
Furmston	
Kenwood	Merry & Clark, New York.
Lion	
Phoenix	Mortimer H. Cort, New York.
Pacific	
Petrel	Bruce & Cook, New York.
Staple	
Vigilant	Mortimer H. Cort, New York.
Westmoreland	
W. T. R.	Bruce & Cook, New York.

Press Working of Sheet Metals.—III.

BY OBERLIN SMITH.

Dies.

It will be well to show by illustrations a few of the most common methods of fastening dies to the beds and rams respectively of the presses in which they are to be used. Some of these varying methods are equally good, but an important point with the user of such

understood that this bolster is, as usual, simply a flat plate bolted or otherwise secured to the bed of the press to which it belongs in the customary way—such bolsters being generally furnished by the press makers, either as a standard part thereof or especially to order. They often have a hole through them, as in Fig. 24, but are sometimes solid, as in Fig. 25. The general object of a bolster is to occupy some of the spare room up and down which is usually allowed in case extra high dies should be required for some special purpose, and also to partly cover up and bridge over

shape may be regarded as flattening dies, such as are frequently used for straightening and compressing small articles. Almost any variety of dies can obviously be secured by this and the other methods to be described.

Securing Dies.

Fig. 25 shows shank of die U cylindrical instead of conical. In this case the set screw does not need, necessarily, to be countersunk therein. The top end of shank at X is shown as having a bearing against top of ram hole, as well as the top surface of the die proper at Y having its bearing upon the bottom



Fig. 28.

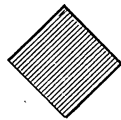


Fig. 29.

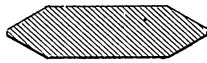


Fig. 30.

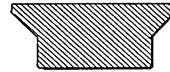


Fig. 31.

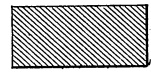


Fig. 32.

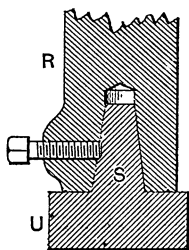


Fig. 24.

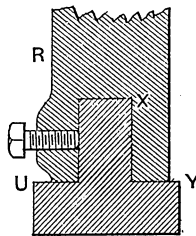


Fig. 25.

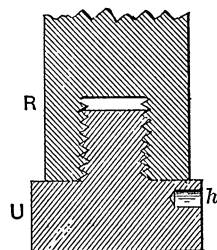


Fig. 26.

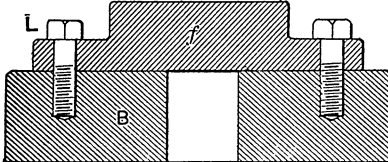


Fig. 27.

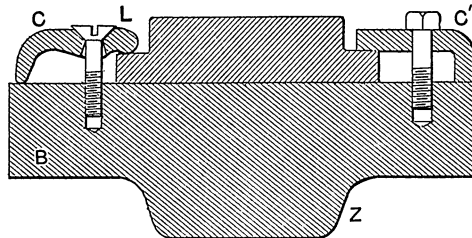


Fig. 33.

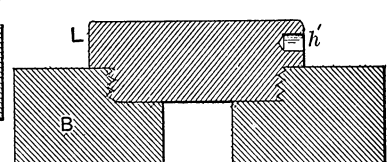


Fig. 33a.

PRESS WORKING OF SHEET METALS.

tools is to arrange for interchangeability to the greatest possible extent—not only that given dies may fit as many presses as possible as far as the kind and size thereof will permit, but especially that the hundreds of dies which he very probably has on his shelves (either actually or in prospect) may, as many as may be, fit in common a given press. Too much importance cannot be attached to the attainment of a strict system of uniformity in these fastenings so that certain dies can be quickly taken out of a press and others substituted, but also that there may be as few changes as possible in the adjustment of the press itself.

Bolsters.

In Fig. 24 is shown, in vertical axial cross section, a bolster, B, on which is fastened by tap bolts screwed into the same a lower die, L, it being

the large hole which is usually made through a press bed, that work of a maximum size may sometimes be dropped through. Both of these objects are obviously to enable smaller and cheaper lower dies to be used for average work than would be the case were each die required to be thick enough and to have its flange or plate *f*, Fig. 24, spread out far enough to reach the bed bolts of the press which usually secure the bolster. In the same figure R is the lower part of a press ram, in which is inserted the upper die U, it being shown in this case with a tapering shank, S. This drives tightly into the socket of said ram and is prevented from slipping out by a set screw, which, for better security, is usually made with a point countersunk into the shank. To save complication, these dies are shown perfectly flat upon the faces which come together, and in this

of ram, it being better in all cases to have as much contact of solid metal as possible, to carry the heavy compressive stresses incident to all work of this kind. The bolster B is shown with a truss or boss, Z, projecting below its bottom surface and extending downward into the bed of press. Such trussed bolsters are often useful for heavy work that happens to be concentrated near the center. In this case the lower die L is shown fastened by tail clamps C, C', the latter being of a crude form often used, where a piece of bar iron is simply bent at right angles and a bolt hole is thrown at it, so to speak, almost anywhere, instead of being put as close to the die as possible.

In Fig. 26 is shown a bolster and ram into each of which the dies are screwed, being revolved by a straight wrench in holes *h*, *h'*, or by making the dies polygonal in shape or otherwise.

In Fig. 27 is shown a horizontal cross section, at a point just below X, of a ram like those in Figs. 24 and 25, the common form of dovetail slide bearings being embodied. This, however, is sometimes varied to some of the other forms shown in Figs. 28 to 32 inclusive. Incidentally a flange, f' , is embodied in this ram, although it might be omitted as far as the other features described are

out at the top, as at X, Fig. 35, so that if desired the shank can have a flange or projection entering into this chamber, and thus be held against any downward pull caused by stripping. &c. Such a socket will at the same time hold flangeless shanks just as well, and will accommodate those of round, round slightly flattened, octagonal or square sections. Furthermore the size of these

tion, on a vertical axis, if fastened with a shank only. Sometimes, however, they are secured with both shank and tap bolts.

In Fig. 35 is shown a bolster, B, to which is fastened a chuck, C', by means of countersunk tap bolts, although it might be fastened in various other ways, or might even be a part of the bolster itself, as in the next figure. In this

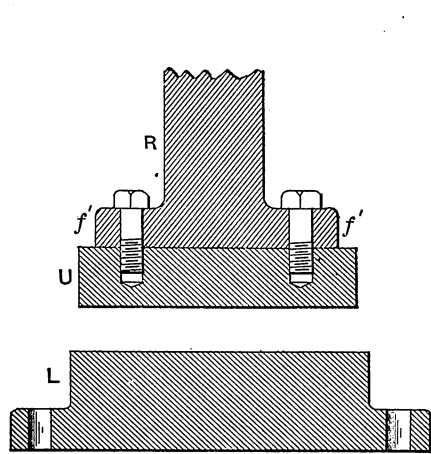


Fig. 34.

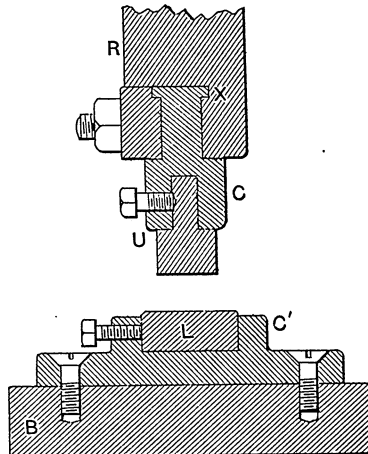


Fig. 35.

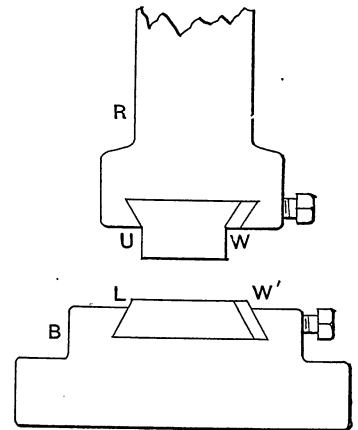


Fig. 36.

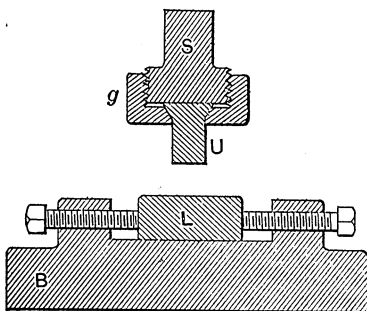


Fig. 37.

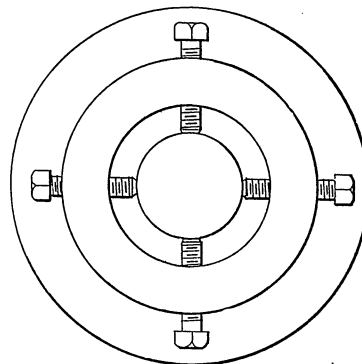


Fig. 38.

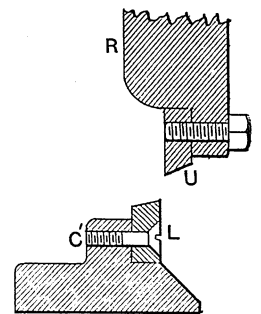


Fig. 39.

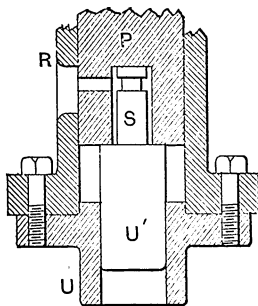


Fig. 40.

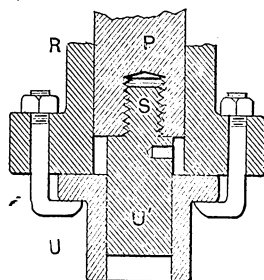


Fig. 41.

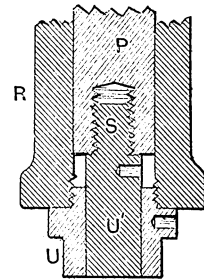


Fig. 42.

PRESS WORKING OF SHEET METALS.

concerned. In Fig. 33 is shown a similar section of a ram fitted with a separate clamp, as in Fig. 35, but with tap bolts to pinch it tightly upon die shank when inserted in the round hole, or punch socket, shown. In Fig. 33a is shown a modification of the latter form where the hole or socket is of rectangular form, set diagonally, the clamp being in this case mounted upon studs and tightened by nuts running thereon. This is perhaps, upon the whole, the best of all methods for holding shanks, especially when the socket is chambered

shanks need not be accurate, as the clamp can be screwed up to various points in its path so as to grasp sizes of somewhat varying diameters.

Fig. 34 shows at L an extra large and heavy lower die, intended to be bolted directly to press bed without a bolster, also an upper die which is perfectly flat on the top and is secured to ram R by tap bolts through flanges f' (shown also in top view at Fig. 27) which are provided thereon. This is an excellent method for large cutting dies which might slightly shift in a rotary direc-

tion, on a vertical axis, if fastened with a shank only. Sometimes, however, they are secured with both shank and tap bolts. chuck is secured a small cylindrical disk or ring shaped die, L, by means of a set screw. This is a common form, especially where there happens to be a large number of small dies which are of the same size outside, it evidently being much cheaper to mount them all in a common chuck in this way than to provide each one separately with a plate of its own. At C is shown an upper chuck, secured in the ram R by the method previously mentioned in discussing Fig. 37, although such a chuck may be mounted according to any of the sys-

tems above described. It is shown that upper die U is secured by a pointed set screw entering its shank, which latter, however, might be either tapering, as in Fig. 24, or screwed, as in Fig. 26. The same reasons in favor of the chuck system apply here as have just been mentioned for the lower die.

In Fig. 36 is shown another chuck system in common use, where the lower die L is dovetailed into the chuck B, which in this case is shown as made in one piece with the bolster, although it evidently might be separate, as in Fig. 35. The upper die U is shown as secured to the ram by the same dovetailed method, although when such dies are small they are sometimes dovetailed to an upper chuck, which is fastened to the ram by any of the methods shown. As here given, these dies are gripped by a wedge shaped gib, W, and also by set screws bearing thereupon. These set screws are, however, generally omitted, dependence being placed upon the wedge alone. In some cases the wedge is omitted, the set screws alone doing the work. In Fig. 37 is shown at B another form of bolster chuck, which is also represented in top view at Fig. 38. In this case the dies fit loosely inside of an upwardly projecting ring upon the chuck (or its substitute, four or three separate lugs) carrying the set screws shown. Such a die may be varied in position by running each set screw in or out to a more or less amount. It is one of the oldest methods for gripping dies, and is still used in many cases, but more especially upon drop presses where the die is solid and heavy and there is no other method provided for adjusting it laterally in place. It is, however, very objectionable for thin, ring shaped dies for accurate cutting or forming work, as the die itself is generally sprung more or less out of its normal shape by the pressure of the screws. In this case the upper chuck is shown as a shank, provided with an enlarged screw thread at its lower end, upon which a gland, G, is screwed. The gland forces the upper die U upward by means of its conical head, and at the same time holds it rigidly in lateral directions. This form is much used for round punching work not exceeding 2 inches or 3 inches in diameter, and is very convenient and cheap, as the punches themselves, which have to be frequently renewed, are of the simplest possible form.

In Fig. 39 is shown a pair of shear blades, the lower one, L, fastened to a chuck, C', or in some cases to a bolster of similar shape, or in still other cases to the bed of the press itself, as made especially to receive it. At U is shown the upper blade, fastened directly to the ram, although in some cases an upper chuck is used. Two ordinary methods of fastening are shown, the upper one consisting of tap bolts tapped into the blade itself, and the lower one of countersunk screws through the blade. In some cases such screws are made longer and mounted with nuts, instead of screwing directly into the chuck.

At Fig. 40 is shown one of the common methods of fastening double action dies, for drawn work, to the ram of a double action press, R, which is usually provided with projecting flanges through which tap bolts run down into the flanged upper die U. As shown, this die is centered by a tenon projecting upward into the ram, the bolts being somewhat loose in their holes. The inner upper die (sometimes called a drawing punch) U' is shown as fitting and guided by the interior of the

die U. Its shank at S is shown as fitting loosely in plunger P of press, so that if there are any inaccuracies due to wear or other causes, it may be rigidly kept in alignment by the die itself. A common method of holding U' from dropping out of plunger embodies a small bolt or other device not here shown, engaging in an annular groove running around S near its upper end.

In Fig. 41 is shown a die not guided by a tenon, but resting with its flat surface against ram R, being secured by sliding hook headed clamps. The inner die U' is screwed into the plunger, the same as in Fig. 26, and the outer die is supposed to find its own position before being clamped to place. In Fig. 42 is shown the same arrangement as regards plunger, but with a threaded socket in ram, into which upper die is screwed. Sometimes a chuck, the upper part of which is fitted to ram in the same manner as is the die itself in Figs. 40 or 41, is used, thus getting the advantage of one chuck which will answer for several small dies. The lower dies are not shown in the last three figures mentioned, as they are fastened by some of the various methods shown for single action dies.

In general, it may be said that a mode of fastening dies which will fulfill the following conditions in any particular case will be found most satisfactory: 1. Great rigidity and absolute security against displacement. 2. Quickness of manipulation, so that dies can be rapidly set and unset. 3. (For some kinds of dies) capability of revolving the dies about their vertical axis to various desired positions in the ram or upper chuck and below, either directly upon the bolster or by revolving the bolster itself, or any lower chuck that may be used. 4. Interchangeability, as previously referred to. 5. Cheapness of design in one or both dies. There are in common use various methods besides those shown, which, however, will give a general idea of the most usual methods.

Accuracy and Durability of Dies.

In making or purchasing dies, after considering what general mechanical forms as above mentioned are best suited to his case, the die user should pay especial attention to getting the proper—not necessarily high—degree of accuracy and durability to suit his particular work. In some cases the accuracy must be very great, as, for instance, where certain pieces of work produced by various dies must assemble together and properly fit each other. In this case durability of certain working surfaces is very necessary in order that the sizes dependent thereon should be maintained as nearly uniform as possible. In other cases accuracy is not necessary, as, for instance, with various kinds of ornamental work, where mere appearance is the chief desideratum. Such dies may, perhaps, be required to have certain surfaces durable for the sake of maintaining the proper artistic effect or of avoiding wrinkles, &c. In other cases, however, there may not be any good reason for special durability, except avoidance of too frequent repairs or renewals. How frequent is a matter which depends wholly upon the required production. If, for example, only 1000 pieces of a certain soft brass ornament are wanted in a year, as is the case in some gas fixture manufactories, it would be foolish to make accurate hardened steel dies, because dies of the softest, cheapest material would run without any apparent wear for the hour or two required to make this quantity.

If, on the other hand, these dies were

required to run every day and all day, making many millions of pieces each year, then the greater the first cost, with its consequent durability, the cheaper as a rule the dies would be in the long run.

The Boiler Makers' Convention.

The seventh annual convention of the American Boiler Makers' Association will be held in Boston, July 17, 18 and 19.

First there will be a full discussion of the tests of the drums which were made in Chicago last fall. This will be inaugurated by an interesting and critical paper on the subject by Vice President H. S. Robinson of Boston. Papers are promised by H. J. Hartley of Cramp's shipbuilding works on "Modern Boiler Making," and by Richard Garstang of St. Louis on "Western River Boilers."

Interesting reports will be made by the Committees on Uniform State Inspection Laws, on Apprenticeship, on Strikes, on Safety Valves and Horse Power.

A list of 28 interesting topical questions will come up for discussion. Members are requested to come prepared to debate them.

The social features will be as follows: A trolley ride through the suburbs of Boston, with a visit to the great Government testing machine at Watertown Arsenal, on which some tests will be made while the members are present. The ride will continue through Cambridge and the Harvard College grounds. An evening banquet will be the next attraction. At the close of the convention an entire day will be devoted to a ride on steamer down Boston harbor to the historic town of Plymouth, where opportunities will be given to kiss the "Yankee Blarney Stone."

F. E. Leonard, chairman of the committee, has suggested the following topical questions:

1. Is there any advantage to be gained by beading over the ends of boiler tubes in comparison with those properly expanded with a roller expander?

2. Do you think there is any advantage in having one or more vertical spaces between tubes to assist circulation in comparison with ample space between each row of tubes?

3. Have you any figures to show the saving of fuel between a dirty set of tubes and a new set in the same boiler? Is the saving as much as usually claimed?

4. Do you think that a rivet hole punched, say, $\frac{5}{8}$ inches, when drilled out to $\frac{3}{4}$ inches, would answer all the purposes of a $\frac{3}{4}$ -inch hole drilled from the solid plate?

5. What should be the depth of flange inside the head for boiler head plates $\frac{1}{4}$ inch, $\frac{5}{16}$ inch, $\frac{3}{8}$ inch, $\frac{1}{2}$ inch, and $\frac{5}{8}$ inch thick?

6. Would the demands of the trade in your section of the country be covered by the following diameters of boilers: 30 inches, 34 inches, 38 inches, 42 inches, 48 inches, 54 inches, 60 inches, 66 inches, 72 inches, for a United States Standard?

7. What is the best plan of rack for holding boiler plates, either on edge or lying down flat?

8. Are bridge walls a necessity for the better consumption of fuel?

9. What distance should bridge walls be from the bottom of the shell?

10. Should bridge walls be in a circle at a uniform distance from the bottom of the boiler, or straight across from side to side?

11. What should be the distance from top of grate bars to the bottom of boiler, for soft coal, in stationary boilers, say 36 inches, 48 inches, 60 inches and 72 inches diameter?

12. Should the distance be increased or decreased for hard coal?

13. Have you any rule for the distance from the rear end of a stationary boiler, of above diameters, to the brick wall at back end?

14. In locomotive boilers using soft coal, what should be the distance from the top of the grates to the lowest tube in boilers of 30 inches, 36 inches, 42 inches and 48 inches diameters?

15. Should the distance be increased or decreased for hard coal?

16. Do you think it necessary to double rivet the flange of a dome to the shell for strength?

17. Which is the best plan, to punch one large hole in the neutral part of the shell covered by the dome, or punch a number of small holes of sufficient area?

18. Which do you prefer, the stays in the head of the dome to be riveted to the side, or carried down through the neutral parts and held by nuts?

19. Describe a good plan for holding stays in the neutral part.

20. Would you recommend discarding steam domes and substituting dry pipes in place of them in boilers carrying over 120 pounds of steam.

21. Describe a good kind of dry pipe for stationary boilers that can be made and attached cheaply without getting the work done outside a boiler shop.

22. Describe a good mode of attaching the dry pipe to the boiler and connecting it to the steam pipe or nozzle?

23. What is the best and cheapest plan for heating boiler shops in cold weather?

24. What is the economy, if any, in the use of an automatic damper regulator over and above hand adjusted dampers?

25. What is the economy, if any, of damper regulation in firing with liquid or gaseous fuel?

26. In boilers fired with liquid or gaseous fuel, is there any advantage in simultaneous regulation of the fuel supply, and the position of the damper, either by the same or by different mechanisms under the ordinary control of the steam pressure?

27. Are there any conditions under which oil fuel is cheaper than coal for generating steam at points in the Atlantic seaboard States? If so, what are they, and where?

28. Are there certain general principles underlying the proper connection of steam boilers and engines in a power plant?

The competitive trial of rapid fire machine guns, in order to determine which type is the most serviceable for use in the navy, was begun at the Washington Navy Yard on Friday, July 6, in the presence of the members of the Ordnance Board and the inventors of the guns, or their agents. The guns on trial are the Maxim-Nordenföldt, Skoda, Gatling, Gardner, Accles and Hotchkiss. Each will be subjected to tests as to ease of manipulation, rust, dust, and dry tests; rapidity, ease of discharge and accuracy, similar to those used lately in the trial of rapid fire guns for the army. All but the last named test will be made at the navy yard, occupying about ten days, after which the guns will be taken to the Indian Head proving grounds to determine their accuracy at 500 and 1000 yards.

Trade Publications.

THE GORDON HOLLOW BLAST GRATE COMPANY of Greenville, Mich., have issued an illustrated pamphlet descriptive of their form of grate. The question is asked, prominently: "Do you lack steam? We can help you." The Gordon patent hollow blast grate is made with hollow cast sections, closed at the ends, usually 8 inches in width by 5 inches in depth and from 3 to 6 feet long, as circumstances may require. An air chamber or duct, having a transverse area of $3\frac{1}{4} \times 6$ inches, extends through the body of the grate. From three to five flaring or funnel shaped openings are cast in the top of the grates. These are afterward carefully bored and reamed to a uniform size for the reception of the heavy lid shaped valve with which each opening is fitted. The lid shaped valves are provided with a series of circumferential notches through which air escapes to fan the fire. A flanged blast pipe enters the side wall of the furnace and extends across the ash pit underneath the back end of the grates. It is made up of short tees and sections securely bolted together. The tees correspond exactly with the width of the grates above them. The inside diameter of the blast pipe is from 6 to 14 inches, according to the size of the furnace. Blast is provided by a blower of any form. It is claimed that a grate thus equipped will accomplish vastly improved results in combustion over the ordinary draft grate. It differs from mere forced draft in delivering air to the fire chamber so minutely divided as to utilize perfectly all the oxygen in it, thus greatly increasing the heat units and effecting a corresponding economy in the coal consumed. These grates are adapted to burning slack, wet, awdust, mill waste and other inferior fuels, as well as clean coal. Numerous testimonials from users are printed in the pamphlet, many of them showing remarkable results.

THE CHICAGO ARCHITECTURAL IRON WORKS, Oakley avenue and Kinzie street, Chicago, have issued supplementary sheets to their catalogue, illustrating additional art work which they are prepared to furnish. These comprise galvano-plastic panels of bas-reliefs from the group of six statues, Louvre Fountain, Paris, a galvano-plastic plaque reproducing the battle of the Amazons, by Benvenuto Cellini, and a number of exceedingly handsome door plate designs.

THE LINK BELT MACHINERY COMPANY of New York, Philadelphia and Chicago describe in a catalogue their elevators and conveyors for handling clay, tile, bricks, brick dust, &c.

FROM FRASER & CHALMERS OF CHICAGO we have received several pamphlets describing some of the machinery built by them. The descriptions cover the Jones underfed mechanical stokers, the Comet rock crushers, Riedler pumping engines for mining and water works, vertical triple expansion Corliss engines, &c.

WE HAVE RECEIVED an illustrated catalogue describing the improved tumbling barrels made by Henderson Brothers of Waterbury, Conn. Their patent double exhaust tumbling barrels are made of any form, size and internal arrangement that the nature of the work to be done requires. They can be adapted to clean, smooth, brighten and polish nearly every variety of iron and brass castings and wrought metal work. Steel lined wood staves and steel plates reinforced with iron bars give excellent satisfaction. They make brighter work, and are lighter to handle and more durable than cast iron staves. The catalogue describes many different forms of tumbling barrels and shows several ways of driving them.

AN ILLUSTRATED CATALOGUE has been published by the Northampton Emery Wheel Company of Leeds, Mass. It is stated that the emery wheels made by this company are warranted to stand a speed of 5500 feet per minute at the periphery, with an ample margin beyond this rate for accidental increase of speed. We quote the following concerning "speed":

The centrifugal force evolved by an emery wheel in motion is, "as the square of its velocity;" hence a wheel of any given

size is subject to four times the breaking strain at 2000 revolutions that it is at 1000, and at intermediate rates, of course, in proportion. It will therefore readily be seen that a comparatively small increase in the number of revolutions adds 100 per cent. to the breaking strain. This fact should be understood and its importance appreciated by all who have the care of emery wheels. No man of ordinary intelligence would think for a moment of keeping a steam boiler in constant use at 200 pounds pressure which was warranted at but 100, yet this would be precisely the same as running an emery wheel at 1400 revolutions per minute which was warranted at 1000. Many who use solid emery wheels, although aware that every machine or tool must have a nearly fixed rate of speed peculiar to itself to work to the best advantage, ignore this fact in the use of emery wheels, and pay little regard to the speed at which they use them, as if an emery wheel were bound to work in a satisfactory manner regardless of conditions. If a thin, soft wheel or disk of soft iron be run at a sufficiently high rate of speed it will cut the hardest file in two without being itself affected thereby; if the same disk be run at a low rate of speed it will be cut away by the file instead. The same principle applies in the case of emery wheels. It is just as necessary to run an emery wheel at a proper rate of speed in order to secure the best results as it is a saw, lathe, planer, or any other tool. Used at a proper rate of speed the emery wheel cuts away the hardest metal without being itself much affected thereby. Run at too low a rate, the wheel itself is rapidly worn or scraped away. Contrary to the ideas of some makers and many users of emery wheels, they generate heat in exact proportion to their rate of speed, and the faster they are run the more liable they are to glaze. There is also a limit beyond which it is useless to run them, therefore, although there is no exactly defined limit at which a wheel must be run to render it effective, experience has demonstrated beyond controversy that, taking into account safety, durability and liability to heat, 5500 feet per minute at the periphery, or outer surface, gives the best results.

"MODERN TURRET LATHE PRACTICE" is the title of a pamphlet issued by the Gisholt Machine Company of Madison, Wis. It describes and illustrates a 28-inch turret lathe turning a cylinder head; a 28-inch gap lathe boring and turning a clutch sleeve; a $1\frac{1}{2}$ -inch screw machine turning chuck screws, and a universal tool grinding machine grinding the side of a tool.

MONTAGUE & FULLER of New York and Chicago have issued a pamphlet describing and illustrating the bookbinders' and printers' machinery exhibited by them at the World's Fair.

The new cruiser "Minneapolis" left Cramps' shipyard, on the Delaware River, on Monday, for her official trial trip, which will occupy a week. The actual speed trial will be run on Saturday over the 40-mile official course, from Cape Ann, Mass., to Cape Porpoise, Maine. According to the contract with the Government the cruiser is required to maintain a speed under steam of 21 knots for four consecutive hours, a bonus of \$50,000 being awarded for every quarter knot accomplished over that speed. The "Minneapolis" on her builder's trial last month obtained a speed of 21.75 knots under unfavorable conditions of weather, wind and fuel, having used anthracite coal in her furnaces. On this occasion hand picked Pocahontas coal will be used, and it is confidently expected by her builders that a speed of nearly, if not quite, 23 knots will be attained.

Peden & Co., tin plate importers, iron merchants and jobbers, of Houston, Texas, announce by circular that R. P. Smith, who retired from the firm of Smith, Peden & Co. on May 1, had no moneyed interest in the firm, which is continued by the remaining partners, D. D. Peden and E. A. Peden.

The Meyers Milling Machine.

A machine has been designed by Ernest Meyers of Taunton, Mass., for milling dies or other irregular surfaces from a pattern on an enlarged or a reduced scale. The drawings show the machine in side view in Fig. 1, in plan in Fig. 2, sectional end elevation in Fig. 3, while Fig. 4 is a side view of part of the machine, showing three milling tools and a tracer, secured to the way bar and arranged to multiply the pattern on a reduced scale. The end and middle frames *a* extend across the bed plate *b*, which is formed with a central longitudinal opening for securing the chuck carriages by a central bolt in the usual way. At the left hand of the bed plate is secured the standard *c*, carrying a spindle provided at its upper end with the plate *d*, in whose two opposite sides are conical holes to receive the points of screws, so as to secure the yoke *e* pivotally to the plate *d*. The end of the way bar *f* is firmly secured to the yoke. The vertical adjustment of the spindle is provided for by means of a screw threaded into the bottom of the standard *c*.

In this machine the successful milling of dies requires that the way bar, on which the tracer and one or more milling tools are supported, shall be firmly held at one end, so as to prevent jars or tremors and yet be free to swing horizontally as well as vertically. The weight of the way bar with the milling tools and tracers requires to be supported by a counterbalance to prevent excessive pressure of the tracer on the pattern. The end of the way bar opposite the end where it is pivoted in the standard *c* must be moved horizontally, so as to carry the milling tool or tools and the tracer preferably across the surface of the pattern or the piece to be cut, although on most of the work a movement across one-half of the surface—namely, from the center to the periphery—is sufficient to completely cut one or more duplicates. The next essential is to secure the positive turning of the pattern and the work at such a speed that the milling tool or tools can cut the metal as fast as the same is fed

ing the stylus are firmly supported, so that the milling tool and the stylus extend down through the space between the two sides of the way bar. The end of the way bar at the right hand end of the machine is supported by the balance weight *g*, arranged as indicated in Fig. 1. This end of the way bar has a rectangular opening in which rollers, shown in plan in Fig. 2, are journaled and adjusted to bear on the spindle *h*, one roller being in fixed bearings and the other in adjustable. The spindle is

projection of the carriage and then exert a strain on the shipper arm by which it is moved to a little beyond the perpendicular position. The weighted end now descends and by this sudden motion disconnects the clutch from one and connects the same with the other of the beveled gears, and thus reverses the rotary motion of the screw and the sliding motion of the carriage and with it the movement of the end of the way bar *f*.

The carriages *l* slide on the bed

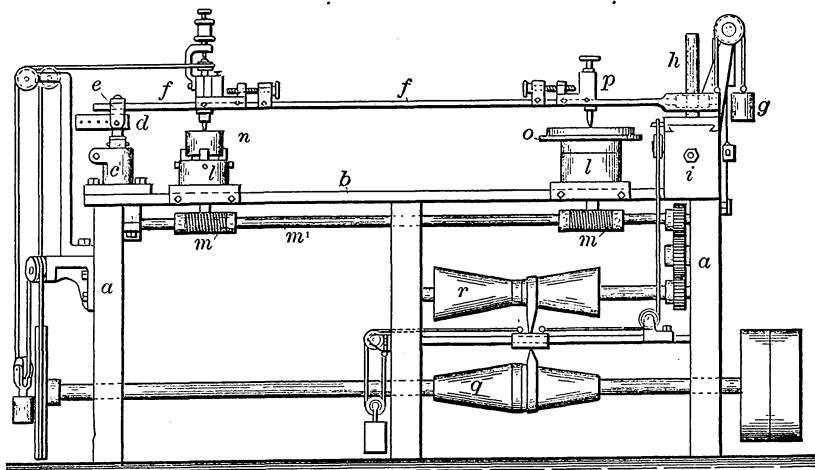


Fig. 1.—Side View.

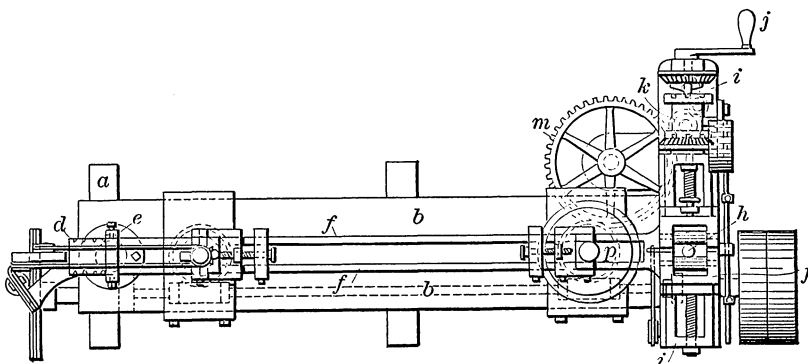


Fig. 2.—Plan.

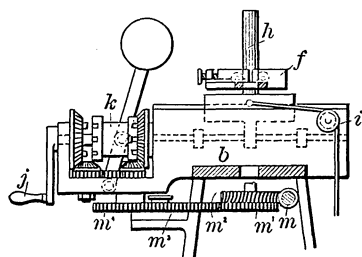


Fig. 3.—End View.

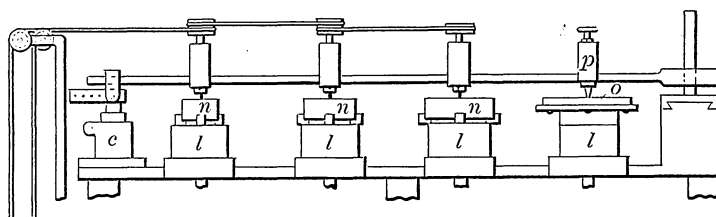


Fig. 4.—Part Side View, Showing three Milling Tools and a Tracer.

THE MEYERS MILLING MACHINE.

up to it, and as the feed of a revolving disk to the milling tool increases as the milling tool moves from the center toward the periphery and decreases when it is moved toward the center, it is essential that the revolution of the pattern and the work be accelerated as the milling tool moves toward the center and retarded when the milling tool moves toward the periphery or away from the center.

The way bar is formed for the greater portion of its length of two ways, on which the carriages supporting the milling tools and the carriage support-

secured to a sliding carriage connected with the transverse head *i* by a dovetail slide. By turning the crank *j*, which is placed on the end of a screw, a sliding motion may be imparted to the carriage. Provision is made for automatically moving the carriage, and with it the way bar, by power, the clutch *k* being adapted to engage either of the bevel gears, as shown in Fig. 2. To the clutch is connected a shipper arm, which is operated by a rod provided with adjustable tappets, which, when the carriage approaches the end of its traverse, come in contact with a

plate and can be adjusted and secured in any desired position. They form the supports for chucks and are provided with journal bearings in which the vertical shafts of the chucks turn, the lower ends of these shafts being provided with worm gears which engage with the worms *m* secured to the shaft *m'*. The work *n* and the pattern *o* are each secured to and turn with one of the chucks, and all the chucks turn in the same direction and make the same number of revolutions in the same time. The tracer is supported in the standard *p*, which is grooved at its lower face so

as to set down over the two ways of the way bar. Both the tracer and milling tool may be accurately adjusted on the way bar and securely clamped in position. The milling tool is also provided with a vertical adjustment. The method of driving one or several milling tools is clearly shown in Figs. 1 and 4. Motion is imparted to the machine through the pulley shown at the right in Figs. 1 and 2. On the opposite end of the shaft carrying this pulley is a second one from which the milling tools are driven. The motion from the double cone pulley *q* is transmitted to the cone *r* by a belt passing through a shipper and through the gears shown in Fig. 1. This shipper is connected to the sliding carriage so that the speed transmitted to the worm shaft *m'* is increased as the belt approaches the center of the cone pulleys and is diminished as the belt moves toward either end. It will thus be seen that the pattern can be duplicated by one or more tools and that the scale of reduction can be accurately determined.

Niagara Falls Dynamos.

Nature states that the patent for Professor Forbes' construction for the dynamo for the Niagara Falls power station has been allowed. One object to be attained was to have a fixed armature, so that the armature might be wound so as to give a very high E.M.F. without being subjected to the enormous centrifugal forces of the revolving part. Another object was to attain a maximum fly wheel effect with a minimum weight. The revolving parts of the turbine and dynamo, and the vertical shaft connecting them, are all supported hydraulically by means of a piston in the turbine. The supporting power of this piston limited the weight of the revolving part of the dynamo to 80,000 pounds. The governor of the turbine demanded—to fulfill the required conditions of regulation—a momentum equal to 1,100,000,000 pounds, moving at the rate of 1 foot per second. Both of these objects are attained by Professor Forbes' construction, which consists in making the armature fixed and ring shaped with a space inside for getting at the bearings, and in making the fields of a bell shape, the poles being on the inside of a nickel steel ring, which is supported by the top piece or cover, which in its turn is rigidly fixed to the vertical axis. This novel construction gives all the fly wheel effect required, without making the weight too great. Every design which had been made previously required the addition of a fly wheel costing at least £800 or £1000. The construction for which Professor Forbes' patent has now been granted has also the great merit that the magnetic pull between the armature and the fields tends to diminish the breaking strain of centrifugal force on the revolving part.

The work of demolishing the World's Fair buildings at Chicago was expedited by a destructive fire on the evening of the 5th inst. It broke out in the Terminal Building and spread to the Administration, Mines and Mining, Electricity, Machinery, Agricultural and Manufactures buildings, inclosing what was known as the Court of Honor. Some of these buildings were not completely destroyed, but not much was left of most of them but shapeless masses of distorted steel frame work and charred timbers. The buildings belong to the

Columbian Exposition Salvage Company, who have for some time been engaged in the work of tearing them down and disposing of the material.

CORRESPONDENCE.

Steel Making in the South.

To the Editor: In Mr. Nau's letter, published in your issue of June 21, he takes exception because I object to the statement that metal can be converted into steel here by the basic Bessemer process, for all operating expenses, of \$3.78 per ton, and refers to a completely itemized cost sheet which appeared in *The Iron Age* on December 21, 1893, to confirm some of his items included in the vague term of general expenses. This statement is evidently prepared by a gentleman who is practically acquainted with the actual working of a basic Bessemer shop. If Mr. Nau will refer to this cost sheet again, he will find that this authority puts down the cost of ferro and spiegel at \$1.24 per ton of ingots against his 45 cents. Again, if he will look at the items of dolomite and tar, he will find that 90 pounds of dolomite and 2 gallons of tar are used per ton of ingots against his 50 pounds and $\frac{1}{2}$ gallon. It appears, therefore, that some one else is equally extravagant with myself in his ideas of what it takes to keep up a basic converter.

I cannot agree with Mr. Nau in his remark that in all the large works in Europe metal is taken direct from the blast furnace whenever it is possible to do so. At one works with which I am acquainted they gave up using direct metal and returned to remelting, with the result of improving the quality of the steel and decreasing waste. It is equally important to have regular silicon contents in the basic as in the acid converter. Mr. Nau appears exercised that I should have quoted things from his paper which he did not describe. I was led into this by his own description of the plant. He said: "This method doing away with all the machinery, molds, special blowing machinery, hydraulic cranes, pumps and everything required in Bessemer works, can be carried out very cheaply." With no further information on the subject one would naturally presume that the converter was fixed, as it was expressly stated that all the machinery of a Bessemer works was going to be done away with. We are informed that a sketch of this vessel appeared in some Southern paper two years ago. It was my misfortune not to have seen it, so that I was not aware of what Mr. Nau intended doing. We are now told it is a large, rectangular tipping converter, which may be of 20 to 25 tons capacity. I fail to see how this is going to be operated, seeing there is to be no machinery. It appears to me very forcibly that we have already the nucleus of a very large Bessemer plant.

It is stated of what is supposed to occur when blowing metal for about four minutes in an acid or basic converter. The question of what takes place in the basic converter need not be discussed, as it is not suggested to use a vessel so lined for the purpose of treating siliceous metal. We are told about 50 per cent. of silicon is oxidized and a maximum of 20 per cent. of carbon.

I will now give some actual results from published accounts of what occurs in an acid converter working under normal conditions.

Analyses of pig iron and Bessemer charge at different stages of the blow.*

Melted pig as charged into converter.	Metal at end of first stage of blow (about 4 minutes)	Metal after blowing 9 minutes.
Graphitic C. 2.07	2.17	1.55
Combined C. 1.20	2.17	1.55
Silicon 1.95	0.79	0.63

We see that in four minutes about 33 per cent. of the carbon has been eliminated with about 60 per cent. of the silicon. If we look at the nine minute blow we find that over 50 per cent. of the carbon has been removed and there still remains 0.63 of silicon, an amount not low for basic Bessemer requirements.

Again, Greenwood, in speaking of the duplex basic Bessemer process in Witkowitz, which he states was abandoned, gives the following composition of the metal when blown in the acid converter:

Metal as charged in acid converter.	Metal after treatment in the acid lined converter.
Carbon, about 3.50	0.22
Silicon, 2.50	0.81

Here we find a case wherein about 90 per cent. of the carbon is oxidized by the time the silicon is brought down to a reasonable limit for the basic converter.

It appears, therefore, that Mr. Nau will have considerable difficulty in obtaining an iron similar to direct furnace metal, as the metal obtained in the foregoing tests is anything but a thorough pig iron. It also shows that the statement of a maximum elimination of only 20 per cent. of carbon in a four-minute blow is not always borne out in practice.

It is stated that a Bessemer blow lasts about ten minutes, a fact which I do not deny. I must remind Mr. Nau, if he is to make comparisons, that he should let the conditions be somewhat similar in both cases, or else no correct conclusions can be drawn. A ten-minute blow in a Bessemer is due chiefly to the following conditions—viz., low silicon metal, high blast pressure, suitable tuyere area, with reasonable depth of metal. Mr. Nau's proposition is to work under exactly opposite conditions—viz., siliceous metal, low blast pressure, confined tuyere area, with great depth of metal, as the bath may vary from 18 to 37 inches. As a matter of interest I should like to know if actual charges of 20 to 25 tons of metal have been blown under these latter conditions.

I still think it decidedly objectionable to remelt desiliconized and partly decarbonized metal in a cupola. It will take a large amount of coke to melt such metal hot. Manganese will be further sacrificed, and as this will be low sulphur will be absorbed by the metal.

I believe my advice was good when I said that it would be preferable to desiliconize in a properly equipped Bessemer plant, independent of the blast furnace. This idea of attaching it to the furnace will rob it of its efficiency. I have never seen a furnace so burdened which, after supplying its own stoves and boilers, has an unlimited quantity of gas at all times, so that it can afford to give it away for an outside operation at a time, too, when blast is shut off. The proposition of stopping one department to allow another to run is altogether wrong and bad in practice. The best results are obtained from a plant when each department is a unit in itself, independent of each other, so that when one starts to run it is not the signal for another to shut down.

Mr. Nau criticises the phosphide of

* Mr. Snelus, Iron and Steel Institute.

iron theory, and quotes from Dr. Wedding in support of his claim. He tells us that at Hörde they take Thomas metal after decarbonizing, removing about 90 per cent. of the phosphorus in the converter, and pour it into a basic furnace for final treatment. I have no doubt such metal is rapidly converted into good soft steel in the furnace, as they have only 0.30 of phosphorus to deal with, and it does not follow that they do not introduce a useful amount of carbon. But this is not what was suggested. The acid converter is to be used so that the original phosphorus of the pig iron is all retained in the blown metal. The iron used at Hörde contained 2.75 per cent. of phosphorus. If Mr. Nau will decarbonize such metal in his acid converter he will have somewhere about 3 per cent. of phosphorus to deal with in the furnace, a condition which I know would give him some little trouble.

Mr. Nau evidently looks upon Dr. Wedding as an authority upon the basic process. It may be to his advantage if he would follow the opinion of this eminent man with regard to the duplex basic Bessemer. Dr. Wedding tells us in his book when mentioning this modification of the basic process: "There is, however, no excess of heat over and above that necessary for securing a favorable result. This shows the necessity of heating the converter and the lime beforehand and of taking the samples as quickly as possible. On this account Harmet's suggestion to use two converters, an acid and a basic, is not to be recommended, because in transferring from one to the other the material would be cooled too much."

Again, in speaking of the first arrangements of the Hörde basic plant which were made so as to carry on the duplex Bessemer, he says: "After all it would have been very costly, as the transferring requires a great deal of time and labor, and it was fortunate that the operation of transferring was found to be unnecessary."

Here are three things mentioned which go toward making a very high cost sheet—viz., cold metal, loss of time and large amount of labor. The same results were obtained at other works, where it was abandoned. Yet Mr. Nau in his cost sheet does not take into account any of these conditions, but simply adds on 50 cents per ton to the supposed theoretical cost of desilicizing.

I must contradict his statement that I made tests in Pittsburgh. I have not made an experiment or test there of any description with a view to desilicizing pig metal by means of waste basic slag, nor has any been undertaken with my knowledge, so his remarks upon this are quite superfluous and without foundation. However, as Mr. Nau is desirous to see a result of a test with liquid waste basic slag, obtained from a previous heat of steel, with no oxide additions, I will give him one:

	Liquid pig metal as poured into slag.	After mixing with slag.
Total carbon, about..	3.500	1.400
Silicon	2.61	1.050
Phosphorus.....	0.519	0.205

This was made for the Tennessee Coal & Iron Company on 6 tons of metal. Mr. Nau asks the unnecessary question as to whether I consider myself the inventor of the Krupp process. I do not, and at the same time I must inform Mr. Nau that it is not for him to make a decision upon any of the so-called inventions or patents in question.

BENJ. TALBOT.

PENCOYD, PA., June 30, 1894.

Freight Discrimination against American Tin Plate.

To the Editor: I have noticed in the last few issues of *The Iron Age* several articles on discrimination in freight rates. I wish to call your attention to the discrimination of the American railroads against the American tin plate manufacturers. Inclosed you will find two circulars, one from the largest tin plate handlers in Wales and the other from a large importing house in New York. From this you will see that the rate on tin plates per 100 pounds from New York to Cleveland is 9.3 cents. Our rate to New York is 18 cents. The rates to St. Louis, Chicago, Cincinnati, &c., are less than Cleveland rates to these points. We have called the attention of the freight agents to this matter, but all the answer we get is that it is a "shame."

It seems to us that the railroads are blind to their best interests. As it is, they obtain not over 200,000 tons of tin plate freight, for at least a third of the amount consumed is used on the Atlantic Coast. If we manufactured all our plates they get not only freight on the finished articles, but on all the raw materials, which will be at least 2,000,000 tons, taking in iron ore, coal, steel, lumber, &c. We need the aid of the railroads. We would not care about bringing our rates down to those of the importers if they would only bring their rates up to ours. All we want is to be on somewhat of an equal basis.

CLARENCE R. BRITTON,
Sec'y Britton Rolling Mill Company,
Cleveland Tin Plate Company.
CLEVELAND, July 5, 1894.

The circulars referred to by our correspondent contain figures of cost of delivery at a number of points above quotations given f.o.b. cars New York, Philadelphia or Baltimore. They cover 108 pound, 100 pound, 95-pound and 90 pound boxes. We choose as examples the figures on 100-pound boxes given below.

From the circular of C. S. Trench & Co., New York, March 14, 1894:

"For delivery at the following points the extra cost over the above offers made for import would be:"

Per box, 14 x 20.	100 lb. Cents.	Per box, 14 x 20.	100 lb. Cents.
Boston.....	6	Milwaukee.....	15
Buffalo.....	9	Minneapolis.....	36
Chicago.....	15	Nashville.....	22
Cincinnati.....	14	New Orleans.....	3
Cleveland.....	10	Omaha.....	28
Denver, Col.....	50	Pittsburgh.....	9½
Detroit.....	12	St. Joseph.....	28
East St. Louis.....	21	St. Louis.....	21
Indianapolis.....	15	St. Paul, Minn.....	36
Kansas City.....	28	Sioux City.....	28
Leavenworth.....	28	Toledo.....	12½
Peoria.....	21	Columbus.....	12½
Louisville.....	15		

From the weekly tin plate report of Thomas & Stirling, Liverpool, March 30, 1894:

"For delivery at the following points the extra cost over the above would be:"

Per box, 14 x 20.	100 lb. Cents.	Per box, 14 x 20.	100 lb. Cents.
Boston.....	4.9	Milwaukee.....	16.4
Buffalo.....	10.9	Minneapolis.....	27.8
Chicago.....	16.4	Memphis.....	17.1
Cincinnati.....	13.7	Nashville.....	21.0
Cleveland.....	9.3	New Orleans.....	2.7
Columbus, Ohio.....	11.5	Omaha.....	25.6
Denver, Col.....	49.6	Pittsburgh.....	9.3
Detroit.....	11.5	St. Joseph.....	25.6
East St. Louis.....	20.1	St. Louis.....	20.1
Indianapolis.....	14.7	St. Paul, Minn.....	27.8
Kansas City.....	25.6	Sioux City.....	25.6
Louisville.....	16.4		

EDITOR *The Iron Age*.

THE WEEK.

A strike of fishermen in the Northwest has been successful. It was terminated by agreement of the British Columbia salmon cannery to retain last year's wages, from which it had been proposed to make a cut of 1 cent per fish.

The world's wheat production in 1893 was estimated at 2,449,000,000 bushels. The Swiss Society of Commerce gives the following table of consumption of wheat *per capita* in the various countries named: England, 252 pounds; Italy, 310 pounds; Holland, 283 pounds; Austria, 187 pounds; Portugal, 136 pounds; Denmark, 165 pounds; Germany, 143 pounds; Norway, 66 pounds; Sweden, 66 pounds; Russia, 99 pounds; United States, 357 pounds; France, 705 pounds; Switzerland, 405 pounds; Spain, 418 pounds; Belgium, 378 pounds; Hungary, 351 pounds.

The gold fields of British Guiana are yearly becoming more profitable. The United States Consul at Demerara reports that the yield, which in 1884 was valued at \$4900, increased in the fiscal year 1892-93 to \$3,360,000. Gold seems to abound in all parts of the interior, but the fields are difficult of development, owing to the dense undergrowth which renders the greater portion of the country inaccessible.

In an address delivered by Governor Northern of Georgia, at the opening of the Augusta Exposition, he stated that the agricultural products of the Southern States, exclusive of cotton, for the past ten years, will average more than \$1,000,000,000 yearly, or a total of \$10,609,000,000. The products which yielded this vast sum are corn, \$300,000,000; wheat, \$49,000,000; oats, \$5,000,000; tobacco, \$36,000,000; sugar and molasses, \$36,000,000; rice, \$9,000,000; hay, \$2,500,000; potatoes, \$19,000,000, and other crops, \$185,000,000, making the enormous total of over \$10,000,000,000. The figures he mentioned were authoritative, having been obtained from official sources in Washington.

Galveston, Texas, is making strenuous efforts to secure a share of the large West Indian trade, which now passes through New York. A regular service of steamers has been lately established between the port and Cuba, Jamaica, Santo Domingo and other islands of the West Indies. Government work on the jetties in Galveston harbor is being pushed night and day; and it is said that when the bar has been deepened to 18 feet of water the Southern Pacific Railroad will seek the port.

Shipments of petroleum from the port of Philadelphia during the first half of this year have been 161,082,000 gallons, showing a gain of 11,000,000 gallons over the shipments in the same period of last year.

Borings have been begun for the purpose of determining proper locations for the piers of the New York and New Jersey Bridge. Charles B. Brush is the engineer in charge of this work.

The preparatory works of the great international exhibition to be held at Nijni-Novgorod, Russia, in 1896, are already being actively proceeded with. The exhibition will be established on both sides of the Volga River, the two parts being connected by a bridge to be specially built for the purpose, over which an electric railway will travel.

The Iron Age

New York, Thursday, July 12, 1894.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR.
CHAS. KIRCHHOFF, - - EDITOR.
GEO. W. COPE, - - ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS, - - HARDWARE EDITOR.
JOHN S. KING, - - BUSINESS MANAGER.

The Northwestern Pig Iron Trade.

Southern pig iron is now receiving some crushing blows in the Northwestern markets.

The month of June witnessed the most active trade that Chicago pig iron houses have known for a very long time. Not only were contracts for foundry iron numerous, but some of them were very large, covering the requirements of heavy consumers far into next year. When the buying movement began an attempt was made to control it by limiting the time for deliveries to the remainder of this year and by cutting down quantities to be taken by individual consumers. But this policy was speedily dropped and buyers were permitted to have their own way. An effort was also made to advance prices, in the belief that the buying movement was strong enough to sustain it, but this also proved ineffectual, and the best that can be said is that prices were forced no lower than the rates which had ruled prior to the resumption of active buying. This may be claimed, as a distinct gain, because for many months prices have been steadily receding, with every new contract showing a lower figure than the one preceding it. Something has certainly been accomplished when prices are found to be no longer giving way.

But in all this activity the seller of Southern iron has had no share. He has heard the conflict, seen the smoke and perhaps smelled the powder, but could not participate in the fray. With the lowest prices ever made by Southern furnaces and the lowest freight rates ever known from the South to the Northwest, there has been absolutely no chance for Southern iron to figure in these contracts. It is the first time since Southern iron made its appearance in the Northwest and since foundry iron began to be made by Chicago furnaces that the former has been so completely ignored. Even Southern soft irons, which have hitherto been purchased for mixture with the strong local irons, are neglected. Instances, in fact, are known in which good sized contracts have been made for special soft irons to be made by Chicago furnaces for foundrymen who had for years scouted the idea of attempting to make good castings from all Lake Superior irons. They have now changed their opinions, partly through the influence of price and partly through the better education of the whole iron trade with regard to the chemistry of iron. Chemistry alone

would not have wrought the change, nor could price have done it unassisted, but both operating together have been thus potent.

Peculiar conditions have, of course, favored the Northern furnacemen. They are enjoying cheap ore and cheap fuel, or they could not have met the competition of the very low prices made by the South within the past six months. Southern furnace companies have also been handicapped of late by their striking coal miners, causing quite a number of stacks to be blown out for scarcity of fuel and carrying with it a rapid reduction in pig iron stocks. An advance in freight rates was also a bone of contention between makers and buyers, as each wished the other to assume the risk of changes in freight schedules. All this has helped the Northern furnaceman to secure contracts nearly as freely as if Southern furnaces had no existence. From present appearances the area of consumption of the coke foundry irons made in the Northwest will grow still larger until much of the territory north of the Ohio River is occupied. But when Lake Superior ores advance in price and coke grows dearer, as may be expected at some time in the future, the South will probably have another inning in the Northwest.

The Responsibility of Labor Unions.

There is something bordering on the ludicrous in the claims uniformly put forward by labor leaders that they and their organizations are not responsible for acts of violence committed as the result of a strike. Not one of them is inexperienced and foolish enough to believe that such troubles can be averted without serious measures on their part to prevent them. And yet such a course is never earnestly chosen. If men like Debs spent less time in writing bombastic manifestoes and personally went to such a scene of rioting as the Chicago stock yards district to call off their followers, their professions would be believed. They will lose every fight in which they let the hoodlum and the anarchist run matters in the field while they are scribbling at headquarters. We do believe that a majority of the workmen fully recognize that their cause is only injured by rioting and destruction of property. Let that element take hold and promptly deliver over to the police every outsider who disgraces them by unlawful acts. Let the unions expel every member who has resorted to violence. Such measures would mean something, while the empty prattle of such men as Debs simply makes them and their organizations objects of contempt.

We go a step further and claim that unless the labor unions give convincing proof that they realize their responsibility and act accordingly measures must be adopted to bring them to a realizing sense of the fact that rights are always coupled with

obligations. Since few of them have attachable property to satisfy damages for loss of life and destruction of property, their executive officers, national and local, should be held personally liable.

A Little Object Lesson.

The report just made public of the result of the attempt to operate a rolling mill at Hubbard, Ohio, on the co-operative plan is extremely interesting. After paying up all outstanding indebtedness there will be a surplus of about 25 per cent. to distribute to the stockholders out of the 50 per cent. of the wages that have been retained by the managers to create a capital. This is equivalent to a reduction of 25 per cent. in wages for the time that the mill was in operation. In other words, in order to get out even the company could only afford to pay 75 per cent. of the wage scale. This should be a practical lesson to rolling mill hands of the difficulties which now beset employers. If men who are working absolutely in their own interest, and are therefore watching every corner and practicing the utmost economy in fuel consumption, care of furnaces, breakage of rolls, &c., can not show better results, how can they expect full wages to be paid by manufacturers whose workmen have no financial interest whatever in the plant? By what hocus-pocus can the average mill make a profit when a mill run by first-class men, as this one undoubtedly was, shows such a loss?

Those who have interests at stake in this country are becoming thoroughly disgusted and somewhat alarmed at the attitude of the executives of some of our States. When crazy demagogues like Waite of Colorado, or truckling politicians like Pennoyer, Lewelling or Altgeld are in active sympathy with every crowd which has "demands" and "rights," business men begin to do some thinking. In flagrant cases, as that of Colorado, the majority of moneyed men will pause before they invest in property in a State so governed; and if they have already placed money, will seize the first favorable opportunity to withdraw it. So long as men of the stripe of Governor Waite are kept in power in Colorado, no prudent man will advise capital to seek employment in such a community. Appeals to moneyed non-residents for aid to develop the resources of the country will go unheeded until the State has purged itself of disgrace and has given proof that its business men and its honest labor is in power and is willing and able to protect the sacred rights of property. We refer to Colorado because its ranting executive is a particularly shining example of this type of executive. A blunt and unmistakable warning should be given to the business men in every part of the country in which the disease has taken hold, that if truckling to the un-

ruly element is allowed they cannot expect outside capital to remain with them or fresh money to be invested with them. The time has come when the good citizens must give ample assurances that fondling riotous strikers and nursing commonwealers must stop. Let them speak and act.

Labor Bears the Burden.

The strikes on Western railroads have proved vastly more serious than was anticipated. Loss of life, immense destruction of property, and in some sections the total annihilation of business have been the results. The railroad companies are heavy sufferers, but, as usual, in the attempt to coerce capital a burden has been imposed on labor which it is much less able to bear. A multitude of workingmen, who have no interest whatever in the settlement of the question at issue, have been thrown into idleness because factories could not be operated. In Chicago alone it is estimated that over 50,000 wage workers were laid off last week. They have been deprived of their earnings at a time when regular employment is difficult to obtain and when every effort should be put forth to provide against the uncertain future. Numerous establishments which are usually started up in July to manufacture for the coming season have notified their employees that the resumption of work has been indefinitely postponed in view of the difficulty in securing regular receipts of materials and the risks attending the shipment of manufactured goods. Agricultural implement factories are among these bottled up concerns, and their failure to run will considerably curtail the demand for iron and steel. So interwoven are all transportation, manufacturing and commercial interests that the partial paralysis of the railroads is felt everywhere. And by no one is it felt more severely than by the man whose pay stops the instant he lays down his tools.

The foolishness of strikes, and especially of sympathetic strikes, was never more forcibly shown than in this instance. Men with no grievance have sacrificed permanent and well paid positions merely because they desired to test their strength as trade unionists or else because their union ordered the strike and they "had to obey." Bad as the situation is now, it will be infinitely worse if the labor leaders in other trades succeed in "calling out" their organizations to back up the American Railway Union. Aside from the very great question then involved of an actual insurrection against the United States Government, this means many more thousands of wage workers reduced to idleness and still more widespread demoralization of business. It means privations to workingmen's families and sorrow and distress in countless homes. Employers of labor will lose money, but labor itself will lose more in the aggregate, not only in

money, but in physical suffering, which is the accompaniment of great strikes. The strike epidemic has now been prevalent in the West for about four months, with slight intermissions. It is time that some effective remedial measure should be instituted, not merely for the preservation of capital, which is being so rapidly wasted, but also for the benefit of workingmen themselves.

OBITUARY.

SAMUEL B. VAN DUSEN.

Samuel Bonnell Van Dusen, one of the senior partners of the well-known tin plate and metal firm of Dickerson, Van Dusen & Co. of 29 Cliff street, New York City, died at his city home, 61 West Thirty-sixth street, on Monday, July 2, aged 76 years. Mr. Van Dusen's health had been falling for some considerable time, owing to kidney trouble and a complication of diseases incident to old age. The loss of his wife, to whom he was devotedly attached, about two years ago, after a union of nearly half a century, affected him deeply and appears to have undermined his vitality.

Samuel B. Van Dusen was born in March, 1818, in Philadelphia, where his father was one of the pioneer American shipbuilders. After being educated in the Philadelphia public schools he began his commercial career in a subordinate place in the straw goods business in his native city. While a young man he joined his brother in the coal business in Philadelphia, under the style of Van Dusen, Brother & Co. The firm were extensive operators, and in 1861 Mr. Van Dusen came to this city and opened a branch office in Trinity Buildings, 110 Broadway. In 1875 he retired from active business, having amassed a large fortune. In July, 1876, when John S. Dickerson & Co., the metal merchants of 29 Cliff street, reorganized as Dickerson, Van Dusen & Co., he became a partner with Mr. Dickerson and his son Frank, who are still members of the firm. Mr. Van Dusen remained actively connected with it until about six months ago when infirmity compelled him to relinquish his work.

He was for many years a director of the Greenwich Savings Bank, the New York Eye and Ear Infirmary, and the Colored Orphan Asylum, and was a public school trustee in the Twentieth Ward, from which latter place he retired some 12 or 15 years ago. He was an ardent Abolitionist before and throughout the Rebellion, and his interest in the colored race remained intense throughout his life.

WILLIAM M. WHITAKER.

The sudden death is announced, at his summer residence at Media, Pa., on July 5, of William H. Whitaker, a well-known iron merchant of Philadelphia. Mr. Whitaker was a native of Philadelphia, where he was born 65 years ago. He was for several years a member of the iron firm of Stever & Whitaker of that city. On the retirement of Mr. Stever, in 1869, the business was continued by Mr. Whitaker at 52 North Front street. He was a director of the Union Insurance Company, and at one time acted as president of the American District Telegraph Company.

PERSONAL.

Julian Kennedy, the well-known mechanical and consulting engineer, of Pittsburgh, will sail for Europe on Wednesday, the 18th inst., to remain until September.

C. M. Schwab, general superintendent of the Homestead Steel Works, Homestead, Pa., expects to sail for Europe next week.

James Schleicher has withdrawn from the firm of Schleicher, Schumm & Co., proprietors of the Otto Gas Engine Works, Philadelphia.

A new firm of metallurgical engineers has just been established, Joseph Hartshorne of Pottstown, Pa., and J. S. Robeson of Pittsburgh having entered into partnership. Mr. Hartshorne is very widely known in this country, having been a metallurgist for 22 years. He has been superintendent of the open hearth department of the Cambria Iron Company, superintendent of the Bessemer and blooming mill department of the same company and general superintendent of the steel department of the Pottstown Iron Company. Mr. J. S. Robeson has been in active service for ten years, having been superintendent of the steel department of the Pottstown Iron Company and metallurgist of the Edgar Thomson Steel Works. The experience of the members of the new firm has therefore embraced the construction and management of both acid and basic open hearth and Bessemer plants. Probably no American engineer has had the experience in basic work which Mr. Hartshorne has enjoyed.

Ambrose Beard has resigned his position with the New Philadelphia Company to accept the post of general manager of the Morton Tin Plate Company of Cambridge, Ohio.

David Williams, publisher of *The Iron Age*, sails from Havre on the 14th inst.

Theophilus D. Morgan has tendered his resignation as superintendent of the New Philadelphia, Ohio, Iron & Steel Company, and will be succeeded by Jacob James, formerly superintendent of the Arethusa Iron Works, New Castle, Pa. Mr. Morgan contemplates entering into the manufacture of black plates for tinning purposes.

Samuel Thomas of Catasauqua, Pa., sailed for Europe last week.

J. M. Gettel has resigned as superintendent of the Lebanon Mfg. Company. J. H. Killinger succeeds him.

Jay C. Morse, president of the Illinois Steel Company of Chicago, has sailed for Europe.

H. C. Frick of Pittsburgh is expected to go abroad after he has given his testimony in the armor plate hearing.

Owing to the strikes, all the express companies operating on railroad lines running out of New York are refusing to accept money for transfer, except at the risk of the sender.

According to a recent consular report, the decree issued by the Government of San Salvador, imposing an additional duty of 25 cents per 100 pounds upon all imports, does not apply to products of the United States.

A Slight Increase in Pig Production.

The resumption of work among the coke furnaces had practically been confined up to the beginning of this month to the Pittsburgh district and it is extremely doubtful, from the present outlook, whether there will be a return to the rate of work maintained before the strike until we get well into August.

The production during the first six months of 1894 was about 97,000 tons of charcoal iron, 1,950,000 tons of coke pig and 400,000 tons of anthracite pig, a total of less than 2,450,000 tons, as compared with 2,561,584 gross tons during the second half of 1893, and the maximum of 4,769,683 tons during the first six months of 1892.

On July 1 the active furnace plant, grouped according to fuel used, possessed the following weekly capacity:

Fuel.		
Anthracite.....	32	13,266
Coke.....	53	63,878
Charcoal.....	22	3,806

Totals July 1.....	107	85,950
Totals June 1.....	88	62,517

Increase or decrease..... + 19 + 23,433

The weekly product of all the furnaces on April 1 compared as follows with that of preceding periods:

	Furnaces in blast.	Capacity per week. Gross tons.
July 1, 1894.....	107	85,950
June 1.....	88	62,517
May 1.....	127	110,210
April 1.....	144	126,732
March 1.....	133	110,166
February 1.....	125	99,242
January 1.....	130	99,087
December 1, 1893.....	130	99,379
November 1.....	117	80,070
October 1.....	114	73,895
September 1.....	125	83,434
August 1.....	169	107,042
July 1.....	220	153,762
June 1.....	244	174,029
May 1.....	251	181,551
April 1.....	255	178,858
March 1.....	255	176,978
February 1.....	251	171,201
January 1.....	246	173,068
December 1, 1892.....	246	176,271
November 1.....	244	171,082

The status of the anthracite furnaces was as follows:

Anthracite Furnaces, July 1, 1894.

Location of furnaces.	Total number of stacks.	Number in blast.	Capacity per week.	Number out of blast.	Capacity per week.
New York.....	18	2	980	16	5,568
New Jersey.....	11	2	782	9	3,691
Pennsylvania:					
Lehigh Valley.....	44	11	4,256	33	12,676
Spiegel.....	1	0	0	1	60
Schuylkill Valley.....	27	5	2,734	22	10,002
U. S. Susquehanna Valley.....	14	4	1,359	10	3,182
L. Susquehanna Valley.....	16	2	1,400	14	2,594
Spiegel.....	1	0	0	1	525
Lebanon Valley.....	15	4	1,539	11	5,108
Totals.....	150	32	13,266	118	43,466

For a number of months past our records of active anthracite furnaces show the following:

	Furnaces in blast.	Capacity per week.
July 1, 1894.....	32	13,266
June 1.....	30	12,139
May 1.....	35	17,607
April 1.....	34	17,739
March 1.....	32	16,618
February 1.....	27	13,627
January 1.....	29	13,081
December 1, 1893.....	32	16,188
November 1.....	34	16,166
October 1.....	34	15,398
September 1.....	43	20,758
August 1.....	51	23,572
July 1.....	63	29,298

June 1.....	70	33,916
May 1.....	67	33,168
April 1.....	72	34,641
March 1.....	74	34,773
February 1.....	74	32,871
January 1.....	70	32,772

During July Poughkeepsie in New York, one Crane in the Lehigh Valley, Marshall in the Upper Susquehanna Valley, one Pennsylvania Steel and Warwick in the Schuylkill Valley resumed. One of the Spiegel furnaces of the New Jersey Zinc & Iron Company and Temple in the Schuylkill Valley went out, and one of the Allentown Rolling Mill Company's furnaces was banked.

The capacity of the active coke furnaces was as follows:

Coke Furnaces, July 1, 1894.

Location of furnaces.	Total number of stacks.	Number in blast.	Capacity per week.	Number out of blast.	Capacity per week.
New York.....	7	0	0	7	6,304
Pennsylvania:					
Pittsburgh District.....	24	16	29,170	8	9,724
Spiegel.....	2	1	960	1	900
Shenango Val.....	16	1	1,050	15	14,978
Juniata and Conemaugh Valley.....	16	0	0	16	12,844
Spiegel.....	1	0	0	1	950
Youghiogheny Valley.....	3	1	822	2	1,465
Miscellaneous.....	4	0	0	4	2,500
Maryland.....	5	0	0	5	6,000
West Virginia.....	1	0	0	1	250
Wheeling District.....	8	0	0	8	8,307
Ohio:					
Mahoning Val.....	14	0	0	14	12,024
Central and Northern.....	11	3	3,050	8	6,250
Hocking Val.....	14	1	778	13	3,041
Hanging Rock.....	14	0	0	14	3,452
Indiana.....	2	0	0	2	412
Illinois.....	19	6	13,200	13	3,041
Minnesota.....	1	0	0	1	639
Wisconsin.....	5	1	1,275	4	2,938
Missouri.....	6	0	0	6	3,572
Colorado.....	3	2	1,262	1	600
The South:					
Virginia.....	22	7	3,793	15	9,210
Kentucky.....	7	0	0	7	2,814
Alabama.....	38	8	8,661	30	10,178
Tennessee.....	14	5	4,205	9	4,031
Georgia.....	2	1	652	1	600
N. Carolina.....	1	0	0	1	97
Totals.....	260	53	68,878	207	142,141

As compared with previous months the active coke furnaces make the following showing:

	Furnaces in blast.	Capacity per week.
July 1, 1894.....	53	68,878
June 1.....	40	47,104
May 1.....	75	88,580
April 1.....	82	105,011
March 1.....	82	89,794
February 1.....	80	81,970
January 1.....	80	81,397
December 1, 1893.....	72	78,241
November 1.....	57	58,820
October 1.....	52	53,061
September 1.....	54	56,907
August 1.....	122	77,907
July 1.....	140	117,072
June 1.....	146	132,078
May 1.....	145	139,788
April 1.....	145	135,488
March 1.....	145	133,579
February 1.....	140	129,396
January 1.....	138	131,731

In the Pittsburgh district seven Edgar Thomson furnaces were running on Bessemer and one on Spiegel, on the 1st inst. During June one Eliza, one Isabella, and two Lucy furnaces blew in. One Shoenberger was fired up during the last week in June, but may be compelled to shut down again. One idle Carrie and one Monongahela are expected to start at an early date.

In the other districts dependent largely on Connellsville coke, comparatively few plants were able to get to work before July 1. The Cleveland Rolling Mill Company did start one. A number of stacks in the Shenango Valley are, however, on the eve of re-

sumption, and the Wheeling district also records the blowing in of furnaces. The Chicago plants were running on the 1st inst., but have since been forced to bank on account of the riots. Mayville in Wisconsin blew out in June.

In Virginia Princess is again at work. In Alabama production has been lessened by the stoppage of the Pioneer furnaces. On the other hand, the Tennessee Company started Little Bell on the 13th and No. 1 Ensley on the 28th ult., and Woodward put its second stack into blast.

From Tennessee comes a record breaker on the part of the Sewanee Furnace of the Tennessee Company, which turned out 6679 tons of pig iron in the month of June.

The position of the charcoal furnaces was as follows:

Charcoal Furnaces, July 1, 1894.

Location of furnaces.	Total number of stacks.	Number in blast.	Capacity per week.	Number out of blast.	Capacity per week.
New England.....	13	2	164	11	895
New York.....	5	2	198	3	263
Pennsylvania.....	13	1	63	12	841
Maryland.....	6	1	117	5	301
Virginia.....	13	0	0	13	827
Ohio.....	9	5	344	4	309
Kentucky.....	3	0	0	3	290
Tennessee.....	9	1	100	8	991
Georgia.....	3	1	275	2	230
Alabama.....	13	3	895	10	2,485
Michigan.....	20	4	1,173	16	5,071
Missouri.....	2	0	0	2	597
Wisconsin.....	4	1	352	3	1,760
Texas.....	4	1	125	3	470
Washington.....	1	0	0	1	100
Oregon.....	1	0	0	1	200
Totals.....	119	22	3,806	97	15,730

As compared with previous months the record of active charcoal furnaces stands as follows:

	Furnaces in blast.	Capacity per week.
July 1, 1894.....	22	3,806
June 1.....	18	3,274
May 1.....	17	4,023
April 1.....	18	3,982
March 1.....	18	3,754
February 1.....	18	3,645
January 1.....	21	4,099
December 1, 1893.....	26	4,950
November 1.....	26	5,084
October 1.....	28	5,496
September 1.....	28	5,700
August 1.....	34	5,563
July 1.....	35	7,224
June 1.....	34	8,034
May 1.....	38	8,595
April 1.....	38	8,729
March 1.....	36	8,623
February 1.....	37	8,934
January 1.....	38	8,865

Resumption has only been marked in Ohio, where Jefferson, Mount Vernon, Olive and Vesuvius blew in during July.

Stocks.

The position of stocks, sold and unsold, as reported to us July 1, was as follows, the same furnaces being represented as in former months:

	May 1.	June 1.	July 1.
Stocks.	Tons.	Tons.	Tons.
Anthracite pig.....	155,584	141,712	128,825
Coke pig.....	518,190	3,242	231,420
Charcoal pig.....	226,407	225,628	213,730
Totals.....	900,191	639,765	573,985

It must be remembered, as we have frequently stated in connection with these reports of stocks, that they do not include the quantities held by the large steel companies East and West.

Reports given by the *Northwestern Lumberman* indicate a serious shortage, amounting to billions of feet in the Northwestern pine region.

The Sheet and Tin Scales Settled.

At a meeting held in Pittsburgh on Thursday, the 5th inst., between the Executive Committee of the Association of Iron and Steel Sheet Manufacturers and the Amalgamated Association a settlement of the wage scale governing sheet mills was reached after a session lasting until about 5 o'clock on Friday morning. No material changes were made in the scale as published in *The Iron Age* of June 21, but the Amalgamated Association agreed to hold another conference with the manufacturers should the duty on sheets be lowered by the passage of the tariff bill. The settlement of the sheet scale affects some 40 concerns in the West, many of whom are now idle making repairs, but the scale having been agreed upon will resume operations as soon as these have been completed. Immediately upon the settlement of the sheet scale, a meeting of the Executive Committee of the Tinned Plate Manufacturers' Association of the United States and the Amalgamated Association was held, which was in session until about 4 o'clock on Saturday morning, when a settlement of the scale governing wages in tin mills was reached. The Amalgamated Association agreed to practically withdraw their request for an advance in wages of the shearmen, and also agreed to withdraw the clause in the scale limiting the output of the mills. Another concession made to the manufacturers was that after the passage of the tariff bill, if the duties on tin plate were lowered, another conference would be held and a new scale adopted. The settlement of the sheet and tin scales entirely removes all probability of labor troubles in the West as far as the mills are concerned and considerable satisfaction has been expressed over the fact that settlements have been reached. There are yet three or four wagescales governing steel mills to be arranged, these being Shenango Valley Steel Company, Laughlin & Junction Steel Company and one or two others, but it is believed settlements with each of these concerns will be reached without much trouble.

A British naval service journal mentions that orders have been issued by the Admiralty for the manufacture of an experimental torpedo tube of aluminum. This tube, the paper says, is to be fitted on board a first-class torpedo boat and sent to Portsmouth, where experiments with it will be carried out by the staff officers of the "Vernon" torpedo school ship. It is not unlikely that the preliminary trials will make it necessary to fit a liner of brass to the after portion of the tube, as experience has shown aluminum to be plastic at a comparatively low degree of heat; and, as torpedo tubes are fitted with powder impulse as an alternative means of ejecting the torpedo, the heat at the rear part of the tube is at times very great. Even with liners of another metal the saving of weight in torpedo vessels fitted with aluminum tubes and mountings will be considerable and will more than justify the additional cost of manufacturing the tubes with the new metal.

Builders of pumping engines and manufacturers of water pipe will be interested in the following bit of news from Chicago: "The Council Finance Committee has agreed to favor an expenditure of \$1,209,000 for increasing the water supply. Authority will be

asked of the Council to allow the Controller to advertise for bids for a new pumping engine of 15,000,000 gallons capacity at the Lake View station, two new engines of the same capacity to replace old engines at the Chicago Avenue station, a new engine of like capacity at the Fourteenth Street station, and two new engines of 12,000,000 gallons capacity at the Sixty-eighth Street station; for the construction of 6000 feet of tunnel necessary to extend the old shore intake at the Chicago Avenue station to the 2-mile crib, and the laying of about 15 miles of new mains through improved streets to make these new engines give the best result."

Inland Navigation.

An international congress will be convened at the Hague on July 23 to consider the general subject of the improvement of inland navigation. There will be four sections, the first dealing with the construction of canals and harbors, the second with technical treatment, the third with commercial treatment and economical questions, and the fourth with navigable rivers and their improvement. On the subjects to be discussed, preparatory reports are to be prepared to serve as a basis for debate. In the first-named section the dimensions and conditions of canals suitable for high speed steamers will be the principal topic, the questions set down having reference to the forms and dimensions of the canals which will permit a boat of a given immersed section attaining a desired speed with the least tractional effort; depth, radius of curves, and the best construction for the protection of slopes and berms. The second question put down for discussion embraces every phase of the problem as to which system of power and plant is desirable. In the second section of the Congress the means for preventing and breaking up ice blocks comes first, while the second place is given to the consideration of a subject which is of growing interest—canal traction and propulsion. Not only the progress in developing methods of traction, but the influence of the boat model is to be considered, as well as the speed necessary and attainable. The third or commercial section takes cognizance of tolls, classifications, traffic returns, the desirability of extra charges for movement of locks, dams, bridges, and for night service, and the exemption or reduction of rates for boats returning empty. The fourth section deals with two questions—the relations between the configuration of rivers and the depths of their channels, and with the regulation of rivers at low water, in which latter the subject of weirs has special reference. Various engineers—French, German, Belgian, Russian and Dutch—have been appointed to report on several phases of these questions.

Notwithstanding every effort on the part of the employers to arrive at a settlement of the dispute with their operatives, the prolonged Trenton pottery strike still continues, with little present prospect of an adjustment. Conference committees of manufacturing and operative potters met last week and had practically agreed to compromise on a reduction of 15 per cent. in wages from the old list, when the operatives suddenly withdrew their authority to the committee to settle the strike, reaffirming their claim to the old rate of wages.

Water Tube Locomotive Boilers.

In discussing this topic, the *Engineer* of London says:

To us it appears that no insurmountable obstacle lies in the way of designing a water tube boiler which would comply with the necessary conditions. Practice with torpedo boats has proved that a very great saving in weight can be effected by substituting the water tube for the locomotive type. Again, a much larger grate area than is now admissible could be had, especially if outside cylinders and outside valve gear were adopted, in which there is, of course, nothing experimental, since these things are the rule rather than the exception on the Continent. Again, every locomotive superintendent knows that his boilers give him more trouble and cost more for repairs than anything else. It is more than probable that a suitable locomotive tubulous boiler would give better results, costing less for repairs and up keep. Ostensibly the best type for the purpose is that of Yarrow or Thornycroft—that is to say, an express boiler with small tubes. We are met, however, by the difficulty that such boilers are worked with distilled water, and that they cannot be worked with anything else. But again, engineers never know what they can do till they try. There are, of course, two reasons why ordinary water cannot be used. One is that it causes priming; but it is well known that locomotives can get on with an absurdly small steam space without priming, mainly, it would appear, because the jolting of the engine seems to shake the steam out of the water, and something analogous might very well take place with a tubulous boiler. The second objection to ordinary water is that the tubes would quickly become furred up. Even this, however, might be got over, and a special construction of boiler is possible. Indeed, we have seen a design for a launch boiler in which every tube can be cleaned inside with a steel scraper or wire brush, almost as easily and quickly as the flues of the normal locomotive boiler can be swept. A compound engine might be used with a boiler pressure of 200 pounds, which would give the compound system a fair chance; and lastly, there is no reason why a locomotive with a water tube boiler should prove unsightly, or, indeed, present any remarkable departure from the existing form. The advantage gained would be that, without augmenting weight, it would be possible to increase boiler power by about 50 per cent. For extreme speeds a wheel 9 feet in diameter would be found most suitable, because of the reduction of the number of reciprocations of the piston. But, indeed, any draftsman who possesses ingenuity and a competent knowledge of locomotive engineering will have little difficulty in designing either a very fast or a very powerful locomotive by abandoning the existing type of generator.

Judge Colt has dismissed the suit in the United States Court of the Shipman, Engine Company against the Rochester Machine Tool Works.

Dr. Estanislao Zeballos, Minister to the United States from the Argentine Republic, made an inspection of Cramps' shipyard, at Philadelphia, last week, in order to report to his Government on the facilities of that establishment for the building of war vessels.

MANUFACTURING.

Iron and Steel.

Jennings Brothers & Co., Limited, Pittsburgh, Pa., operating a black sheet mill at Leechburg, Pa., have given notice to their employees that they cannot sign the sheet scale as formulated at the Cleveland convention and presented to the firm by the local committee of the Amalgamated Association. At the same time the firm have given their men notice that they will start their mill when ready, independent of any scale signature. The firm add that they have been and still are friends of organized labor, and prefer at all times to have organized labor in their employ, provided that scale prices are reasonable. The offer made to the men by the firm is that they will pay on a sliding scale based on the actual selling prices of sheets, but which the men would not agree to accept.

Riverside Furnace of the Riverside Iron Works, at Benwood, W. Va., resumed operations on Saturday, the 30th ult., after a stoppage of two months. The Bessemer steel plant of this concern is the only department in which union labor is recognized, and in this department the firm have a scale of wages with the Knights of Labor affecting about 350 men.

A certificate of incorporation was issued at Columbus, Ohio, last week to the Morton Tin Plate Company, Cambridge, Ohio, who will immediately commence building black plate mills. At a subsequent meeting of the stockholders John W. Marquand, Charles L. Campbell, John C. Becket, John C. Morton and A. Beard were elected directors. The officers of the company are John W. Marquand, president; Chas. L. Campbell, vice-president; John C. Becket, secretary and treasurer; A. Beard, general manager. The plant will be located at Cambridge at the junction of the Baltimore & Ohio and Cleveland & Marietta railroads. The buildings will be constructed of iron and steel. Modern machinery and appliances will be used. It is expected that tinning pots will be added to the plant later on.

J. M. Gobble has been appointed receiver of the Williams Rolling Mill Company, at Muscatine, Iowa. Receiver's certificates have been issued to the extent of \$20,000 to enable the mill to be operated. The employees of the mill have agreed to waive the right of pushing their claims, preferring to wait and see if the mill can be run profitably under good management, rather than go elsewhere to seek employment at this time with little prospect of securing it. All profits made above running expenses and 8 per cent. interest on the money invested will go toward paying wages now past due.

The Thomas Malleable Brass & Iron Company of Milwaukee, Wis., are making arrangements to remove their plant to Waukegan, Ill. The company's works were established in 1872 and employ about 175 hands.

The plant of the White River Iron & Steel Company of Muncie, Ind., has been recovered from the hands of the receiver, where it has been for some time, and is now in charge of a Board of Directors composed of E. C. Caleyron, E. R. Templer, W. L. Ball, V. O. Foulke and George M. Cobb. The capital stock is \$100,000. New articles of incorporation were filed recently.

The Sneed & Company Iron Works, Louisville, Ky., have secured the contract for the steel shelves to be placed in the new Congressional Library at Washington, D. C. In the competition for furnishing the necessary steel to be used in the construction of these shelves the Superior Steel Company of Pittsburgh, Pa., manufacturers of hot and cold rolled strip steel, were successful, the facilities of this concern being such that they could furnish the steel nearly absolutely straight, which was one of the requirements of the contract. The contract calls for 250 tons of cold rolled and 50 tons of hot rolled material.

On the 5th inst. the La Belle Iron Works, Wheeling, W. Va., manufacturers of steel nails and muck iron, started 23 boiling furnaces, giving employment to about 150 men. The small nail factory of this concern is also in operation, and has been for some months, but the balance of the plant is idle for want of steel.

The Duquesne Forge Company, Pittsburgh, Pa., with works at Rankin, Pa., have just turned out a porter bar 40 feet

long and 20 inches square for the hydraulic press in the armor plate department of the Homestead Steel Works, Homestead, Pa. This bar was forged from an ingot weighing 35 tons. Two more porter bars are being made, one the same size as the above, while the other will be 30 feet long and 6 inches square. These are probably the heaviest forgings ever made in Western Pennsylvania and are about as heavy as can be shipped by rail, except on a special gun truck.

The Brown Mfg. Company of Pittsburgh have been granted a charter of incorporation, with a capital of \$2000. The directors are Howard Childs, W. C. Sutherland and John Fletcher of Pittsburgh. The new concern propose to engage in the manufacture of iron and steel.

Hubbard Furnace of the Andrews & Hitchcock Iron Company will probably resume blast this week.

Last week a conference was held at New Castle, Pa., between the Shenango Valley Steel Company and the local lodge of the Amalgamated Association over the steel wage scale for the year beginning July 1. While no agreement was reached the prospects for a satisfactory adjustment of the scale are reported as being very favorable. It is not improbable that a sliding scale somewhat similar to that now in force at the American Iron & Steel Works of Jones & Laughlins, Limited, at Pittsburgh, will be adopted.

The blast furnace of the Raney & Berger Iron Company, at New Castle, Pa., which has been idle for some time on account of the coke strike, will probably resume operations within the next few days.

Rosena Furnace of the Rosena Furnace Company, at New Castle, Pa., will likely go in this week.

Atlantic Furnace of the Atlantic Iron & Steel Company, at New Castle, Pa., is expected to resume not later than the middle of this month.

The Lower Union Mills, at Pittsburgh, idle for some time for want of coal, have resumed operations in some departments.

At McKeesport, Pa., last week a meeting was held by about 150 employees of the mechanical departments of the National Tube Works Company and it was unanimously voted to return to work on Monday, July 9, providing the concern would permit them to do so. A committee of two was appointed to call on the officials of the National Tube Works Company and inform them of the desire of the men to return to work. The committee was informed that the plant would be open on Monday morning for all who wished to return to work and the committee immediately issued a call for all employees of the mechanical departments to report for duty on that date.

A part of the pipe foundry of R. D. Wood & Co., at Florence, N. J., was destroyed by fire on the 7th inst.

Work has begun at the ore mines of the Spathite Iron Company at Iron City, Ala. The furnace at Florence is soon to blow in.

The plant of the Indiana Steel Casting Company is to be built at North Anderson, Ind.

The rolling mill and the merchant mill of the Burden Iron Company, Troy, N. Y., are closed down. Only the furnace is running.

It is reported that the Southern Immigration, Land & Title Company will start up the two furnaces of the North Carolina Steel & Iron Company, at Greensboro, N. C.

A local newspaper states that the Hattie Ensley furnace, at Sheffield, Ala., will be ready to blow in toward the end of this month.

The men of the Susquehanna and Columbia Rolling Mills, at Columbia, Pa., have declined to accept a reduction in wages from \$3 to \$2.75 for puddling, with other rates in proportion.

The puddling department of the Pennsylvania Bolt & Nut Company, at Lebanon, has started after three weeks' idleness.

The Montour Iron & Steel Company, at Danville, Pa., have started full.

Machinery.

About June 1 the Jeffrey Mfg. Company, Columbus, Ohio, manufacturers of chain belting, and elevating and conveying machinery, purchased about 4 acres of land lying along the Big Four Railroad track and adjoining their present property. This was done in order that the firm would be able to put up new buildings and have

room for the shops which they intend erecting within a short time. Business is reported as exceedingly good with this concern, and they are greatly rushed in some departments to take care of orders.

The Zero Valve Company of Buffalo, N. Y., have been chartered, with a capital of \$3000. Directors: Chas. S. Webster, Wm. G. Volmer and Howard D. Waters of Buffalo.

The Edward P. Allis Company of Milwaukee will furnish the engines for the electric equipment of the Metropolitan Elevated Railroad of Chicago. These are to be four in number, two having a maximum capacity of 3100 horse-power each and two of 1500 horse-power each. The engines will be of the vertical cross compound condensing type of a new pattern, designed by the Allis Company for direct connected work.

Fire originating in the pattern room of the Climax Iron Works, Corry, Pa., did damage amounting to about \$10,000 to that concern's establishment, besides a whole block of adjoining buildings.

A charter has been issued by the Pennsylvania Secretary of State to the Otto Gas Engine Works of Philadelphia, the directors of which are Gustav Langer, Frederick Breidan and Joseph de F. Junkin of that city. Capital, \$400,000.

The Camden Foundry & Mfg. Company, Camden, Ark., have commenced the erection of a new foundry and machine shop to meet the requirements of an increasing business.

A movement is on foot, under the auspices of the local Board of Trade, for the establishment of a foundry and machine shop at Eufaula, Ala.

Tomlin & Harris have purchased the old plant of the Cordale Machine Company, Atlanta, Ga., and will erect a new machine shop on the same ground.

The Keene Machine Company of Dallas, Texas, have just been incorporated, with a capital stock of \$50,000. Directors: M. W. Keene, A. F. Hearde, W. C. Howard and J. T. Howard of Dallas, and L. R. Henkle of Ellis County, Texas.

The Edward P. Allis Company of Milwaukee, Wis., have sold one side of their quadruple expansion engine which they had at the fair last year to the Kansas City Railroad Company, Consolidated, for their Ninth street station. It will be in the form of a tandem compound engine 26 and 40 inches by 72 inches, with a fly wheel 32 feet in diameter, the engine to be coupled directly to the end of the main shaft. The Edward P. Allis Company have also just secured orders for several large engines in New York and one 28 x 43 inch Reynolds-Corliss engine for the Calumet Elevator Company of South Chicago.

The Common Sense Engine Company, at Muncie, Ind., have gone into new hands, A. L. and J. C. Johnson, W. E. Hatch and Mayor A. W. Brady securing the principal part of the stock.

The United States Projectile Company, at Brooklyn, N. Y., are making extensive additions to their machine shop and have placed the contract for this work with the Berlin Iron Bridge Company of East Berlin, Conn.

The Lodge & Davis Machine Tool Company of Cincinnati, Ohio, have just been awarded a contract by the United States Government for one of their improved screw machines to work stock up to 1½ inches, to be shipped to the Norfolk Navy Yards, Norfolk, Va.

The Babcock & Wilcox Company of New York have secured the contract for furnishing a boiler plant for the electric equipment of the Metropolitan Elevated Railroad in Chicago. They are to deliver and erect a battery of boilers aggregating 3600 horse-power capacity, one-half to be ready for use by October 1, and the other half by December 1. All these boilers are to be fitted with the Babcock & Wilcox automatic chain grate smokeless furnace attachments. It is stated that this is but one third of the plant which is to be ultimately installed.

Maris & Beekley, 2343-2345 Callowhill street, Philadelphia, have just completed a 6 ton 4-foot span traveling crane for the Ingersoll-Sergeant Drill Company, Easton, Pa., for use in their shipping department. Among the orders in course of completion at their works are a 6-ton traveling crane for the Johnson Iron Works, New Orleans, La.; a 5-ton traveling crane for the Pierce-Crouch Engine Company, New Brighton, Pa., and a 3-ton traveling crane for the

Johnson Company, Johnstown, Pa., all of which cranes have a new style of hoist on them, embodying a new automatic brake. They are also erecting in the factory of the Consumers' Ice Company, Seventeenth and Washington avenues, Philadelphia, two 2-ton pneumatic cranes, each to lift 10 cakes of ice at one time and travel the length of the tank by pneumatic pressure.

The Detrick & Harvey Machine Company, Baltimore, Md., are shipping a good many of their open side iron planers to different sections. Among recent shipments was a 42 x 42 planer to Berlin, Germany. The company are also doing a large business in Adams' bolt threading machines and Cook nut tapping machines, which machines they are now making, having acquired the plant and business of the Capitol Mfg. Company of Chicago, Ill.

The Lloyd Booth Company, founders and machinists, Youngstown, Ohio, are operating their plant to nearly full capacity, while certain tools in their machine shop are being operated double turn.

Contracts have been let for the rebuilding of the plant of the Poultny Foundry & Engineering Company, at Youngstown, Ohio, which was recently burned.

At Pittsburgh, the Bryce Universal Fuel Firing Apparatus Company have been organized and will manufacture the Boyce automatic stoker and fuel atomizer. The incorporators are Andrew Bryce, L. I. Kennedy and C. A. O'Brien.

The Chamber of Commerce of Youngstown, Ohio, is making a strong effort to have the National Water Tube Boiler Company of New Brunswick, N. J., remove to Youngstown. The plant of the concern is located in the central part of New Brunswick and they are looking for a location that would give more room as well as other advantages. The concern are now erecting several large boilers for the Ohio Steel Company, at Youngstown.

The Sharon Boiler Works, Sharon, Pa., have recently received several large contracts and expect to keep their plant in full operation for some time to come. Among these contracts may be mentioned the iron work for the new blast furnace to be erected by the Salem Iron Company, at Leetonia, Ohio. Another is the erection of three Kennedy hot blast stoves for the Ohio Iron Company, at Lowellville, Ohio. The same concern have contracts for the erection of a 300 horse-power Wheeler patent boiler at Douglas Furnace, Sharpville, Pa., and a similar boiler at Fannie Furnace, at West Middlesex, Pa.

E. S. Karsnitz of Meyerstown, Pa., will build a new foundry.

Sanford & Groff are building a machine shop at Butler, Pa.

Efforts are being made to induce the National Boiler Works to move from New Brunswick, N. J., to Youngstown, Ohio.

W. Heston and J. A. Keys will build a machine shop at Homestead, Pa.

The Poultny Foundry & Machine Shop at Youngstown, Ohio, is to be rebuilt.

The Standard Brass Company will build a new foundry at Cambridgeport, Mass.

E. W. & L. H. Cline will build a machine shop at Marietta, Ohio.

Hardware.

The Howe Scale Company, Rutland, Vt., have shut down their factory for two weeks, during which repairs will be made and inventory taken.

The capital of the New Haven Brass Goods Company, New Haven, Conn., has been increased from \$3000 to \$9000.

The A. L. Speece Powder Mfg. Company, Harrisburg, Pa., have been chartered, with a capital of \$24,000. The incorporators are A. L. Speece, John D. Bogar, Thomas T. Wierman, Jr., John W. Reilly, Samuel Hauck and David M. Kirk.

The new grinding and finishing shop of the Empire Knife Company, West Winsted, Conn., is nearly completed. The building is 108 feet long, one story high, and will accommodate 50 workmen. Another building will follow if business conditions permit, which will be two stories high on one end. This structure will be used for forging and other work.

E. T. Barnum, Detroit, Mich., has been awarded the contract for the steel jail cells for the new prison at Clayton, New Mexico.

Coburn Trolley Track Mfg. Company, Holyoke, Mass., during the past month have received orders for their store ladder service from London, Manchester, South-

ampton, Glasgow, Edinburgh, Belfast and Paris. The company have decided to establish a permanent office in Great Britain.

The North Star Fiber Company of Minneapolis, Minn., have filed articles of incorporation. The plant of the company will be located at Lanesboro. The capital stock is \$25,000.

The plant of the Taunton Twist Drill Company, Taunton, Mass., was damaged by fire on the 2d inst. to the extent of \$2000. The loss is fully covered by insurance.

The Yale & Towne Mfg. Company furnished the special locking device required for the massive bronze doors about to be placed in Trinity Church, New York. The front and side doors constitute the Astor memorial, of which Richard M. Hunt is the architect, and are referred to as among the most important works of the kind yet produced in this country. It has taken three and one-half years to complete them.

The Carroll Muzzle Company, Carroll, Iowa, report an increasing demand for their calf weaner. They advise us the large wholesale and jobbing hardware trade now handle these goods, and the retail trade can be supplied through this channel. If the wholesale dealer does not carry them shipments will be made direct from the factory. This weaner has now been on the market several years, and is, of course, past the experimental stage. Many complimentary letters are received regarding them from those who have used and sold them.

C. W. Dunlap, 88 Chambers street, New York, who is a veteran manufacturer of household wares, since the abandonment of the Brooklyn plant five years ago has been steadily increasing his facilities at his factory in Centre street, New York. While not doing so large a trade as four years ago, we are advised it has proved relatively much more remunerative. We are informed that within the last two years trade with jobbers has been gradually increasing, until now it has attained a very satisfactory volume. Among the goods he produces may be mentioned chopping and mincing knives, can openers, cleavers, kitchen forks and knives, skewers, carpet hammers and stretchers, tack claws, slaw cutters, awls, cold chisels, garden implements, lemon squeezers, ice picks and chisels, &c., to the quality and finish of which careful attention is given.

The Enterprise Mfg. Company, Canandaigua, N. Y., have leased the plant and machinery of the Vanderbilt Sash Balance Company of that place, and in connection with the manufacture of the sash balance will make a line of door checks and other hardware specialties.

Miscellaneous.

The Cornwall Ore Banks Company, Limited, Cornwall, Pa., who for some time past have had a small force of men employed working on half time, have resumed work on full time. This is made necessary, it is stated, by a largely increased demand for ore.

The St. Louis Railway Company of St. Louis, Mo., have placed the order for their new car barn with the Berlin Iron Bridge Company of East Berlin, Conn. The building will be 64 feet in width and 185 feet in length, with brick walls, the roof being of iron covered with the Berlin Iron Bridge Company's anti-condensation corrugated iron roof covering. It is the intention of the railroad company to make this station absolutely fire proof and thereby save insurance. There will be no wood work used in the construction of the building.

The Peteler Portable Railway Mfg. Company, Thirtieth avenue, S. E., Minneapolis, Minn., have 2000 of their dump cars in use on the new Chicago drainage canal. The McArthur Bros. Company, contractors, have recently purchased for use on the canal 100 cars of a new pattern just brought out by the company. The new cars are built with a steel frame, dump on one side only and are especially adapted for use with steam shovels, having no posts at the corners to be bumped. The doors of these cars are hung on independent posts which extend down to the truck. When the car is dumped the door is thus kept elevated, allowing plenty of room for the load to pass beneath, no matter how large the pieces may be. The company make a specialty of small cars for tunnels, quarries, coal docks, &c. Their works are completely equipped for turning out every part of frame and truck, including wood working and iron working tools, foundry for soft castings and

car wheels, brass foundry, &c. The couplings and journal boxes used on these cars are the special design of F. Peteler, manager. The couplings have spring buffers and the journal boxes are arranged to hold saturated waste so as to keep axles well oiled. Wheels are forced on axles by hydraulic power in the same manner as in building large cars. The company have just issued a handsome catalogue illustrating and describing the various kinds of cars which they manufacture.

The Cambridge Roofing Company, Cambridge, Ohio, continue to add new machinery to their plant. They have recently placed in position modern machinery for the manufacture of conductor pipe; also a new squaring shear having knives 138 inches long. This company report business in good condition.

The Moline Plow Company of Moline, Ill., are building an important addition to their works. The old scale shop has been torn down and in its stead will be erected a handsome and substantial brick building, 275 x 60 feet, four stories high. The company will also put in a new boiler plant.

Among new corporations chartered during the week at Albany, N. Y., are the Eldridge Electrical Mfg. Company; to manufacture electrical appliances and apparatus and engines, boilers and machinery in Eldridge, Onondaga County, N. Y. The capital is \$10,000, and the directors are W. C. Ranney, Lewis B. Doman and Albert E. Doman of Eldridge.

Application for a charter of incorporation of the Harbison & Walker Company of Pittsburgh has been made. The concern will engage in the manufacture of fire brick, and will succeed the present firm of Harbison & Walker, at Pittsburgh.

The Wrought Iron Bridge Company, Canton, Ohio, have been awarded the contract for the erection of a steel bridge over the Grand River, at Dimondale, Mich. The same concern have a contract for the building of an iron bridge at Excelsior Springs, Mo.

Wm. S. Kennedy has been appointed receiver for the Clinton H. Meneely Bell Company of Troy, N. Y.

A company is to build a plant at Wagner Junction, near Philadelphia, to make solid steel wheels by the process of James A. Facer of Germantown, Pa.

The Clark Stamping Company have been organized at Rochester, N. Y.

The plant of the Missouri Valley Bridge & Iron Works, at Leavenworth, Kan., has started up, after two months' idleness.

A part of the Johnstown plant of the Johnson Company will be used for the manufacture of a new car truck.

The regular monthly meeting of the Western Foundrymen's Association has been postponed on account of the railroad strike from July 18 to Wednesday, July 25. It will be held on that date in room 701 Western Union Building, Chicago, at 7.30 p.m.

T. L. Courtney, Jr., has resigned as vice-president of the Smith-Courtney Company, and has arranged with Cornell, Hiscox & Underhill of 13 Gold street, New York, to represent them as general manager of their business in the Southern States, with headquarters at 1413 Main street, Richmond, Va. The firm deal in supplies for railroads, mills, mines, furnaces and contractors. Mr. Courtney is prepared to submit plans and estimates for boilers, engines, mining and coal cars, dry kilns, coal and ore handling machinery and general labor saving devices.

The "Daring," one of the new British torpedo boat destroyers built by Thornycroft, in her recent speed trial on the Thames eclipsed the high speed record held previously by the "Hornet," another of this new type of vessels. The "Daring" attained against the tide a speed of 29 2/3 knots, while the Yarrow built "Hornet" accomplished but little over 28 knots. The "Daring's" record is the highest made by any vessel.

The Iron ^{AND} Metal Trades.

The week has been one of exceptional dullness throughout the whole Iron and Metal industry. To this the rioting in Chicago and the general feeling of uneasiness have greatly contributed. Business men have not been inclined to consider purchases or sales while an irresponsible labor organization was trying to bulldoze the transportation interests of an important section of the country. Fortunately, the latest news is reassuring.

In the Iron trade proper labor questions are adjusting themselves in a satisfactory manner. The Sheet mill scale has been signed, and some of the Steel works are getting their scales into good shape. Wages in many instances are low. It may even be said that in some branches and in some localities they are unduly low. But until there is a revival in the demand and until better prices are secured there can be no betterment in this respect. Those mills which have at least regular employment are doing the best attainable for their men.

The Coke strike drags along and keeps a good many furnaces idle. Our monthly blast furnace report shows that thus far it is the Pittsburgh district which is getting nearly the whole of the benefit which has grown out of heavier Coke shipments.

The success of the Chicago furnaces in crowding the Southern producers out of their territory on Foundry Pig Iron offers some explanation of the failure to advance prices on Southern Iron in other sections. Under ordinary conditions the withdrawal of some producers, the stoppage of others and the lowering of stocks all around ought to have stiffened prices. But the fact is that the demand is very light all around and that the Southern producers have lost their hold on an important territory. When they are again running full they may be forced into active warfare in other leading markets.

All the different branches of the Finished Iron and Steel trade are woefully dull, and there is really very little work in sight. In some of the large towns like New York the bulk of the season's work in the architectural line has been contracted for, while the railroads continue to be wretchedly poor customers.

Philadelphia.

Office of *The Iron Age*, 220 South Fourth St., PHILADELPHIA, Pa., July 10, 1894.

There is but little of interest to report in the Iron and Steel trade, although considering the unsettled condition of things in the West the volume of business is larger than might have been expected. Furnaces are well sold up on almost all the various grades, and such of the mills as make any pretense of running at all are doing quite an active business. Prices are steady, and from present appearances consumers would have to pay full quoted rates before they could place orders, as in all departments there is a disposition to secure some advance, so as to compensate for the higher cost of production. The firmness is due more to the decrease in the supply than to any increase in demand, but holders appear to be confident of their position, and either get their price or decline to do business.

Pig Iron.—Sellers say the market is very dull, but when it is remembered that production is not more than 40 % of what it was two or three years ago, it could not be otherwise than dull when regarded from a seller's standpoint. With production reduced to such an extent, sales must necessarily be in proportion, so that it is no wonder they complain that business is dull. Nevertheless it is significant to find that there is very little Iron for sale. Sales agents say that it is hard to get deliveries, and that consumers do not want to buy new lots until the old orders are completed, so that new business is comparatively slow, especially as better prices are required in the majority of cases. Taking everything into account, therefore, it would seem that the market is shaping for improvement, notwithstanding its dullness and the apathy of buyers. Production has been cut down to such an extent that it does not require much of a demand to absorb all that is made, and as stocks on hand are decreasing, it looks as though current requirements would have to be supplemented by a larger output, which is not likely to be done to any extent unless prices are more favorable than they are to-day. Two or three weeks later on the situation will no doubt be more fully developed, but in the meanwhile there seems to be absolutely no chance for lower prices, while many things may happen to put them higher. To day's quotations are about as follows for Philadelphia and equivalent points:

Bessemer.....	\$13.00 @	\$13.50
Standard No. 1 Foundry X....	12.50 @	13.00
Standard No. 2 Foundry X....	11.50 @	12.00
No. 2 Plain.....	10.75 @	11.00
No. 1 Soft.....	11.50 @	11.75
No. 2 Soft.....	10.75 @	11.00
Standard Gray Forge.....	10.50 @	10.75
Ordinary.....	10.25 @	10.50

Steel Billets—No business has been done in this vicinity for some time past. Sellers ask \$19.75 @ \$20, delivered, and while the chances of lower figures do not appear to be very strong, buyers make no response to the figures named. Deliveries on old contracts at \$17 @ \$18 are still due to many of the largest consumers, and they are more anxious to have these completed than to enter into new engagements.

Finished Material.—There is no room for complaints, considering the unsettled condition of business generally. Mills that are running at all are doing pretty well, some claim to have all the business they can handle, with several weeks' work ahead, but in other cases it is largely a day to day business,

and nothing to indicate any special change in the immediate future. As the Pittsburgh mills are likely to start up without much further delay, they will probably be reaching out into this territory again, but in the meanwhile a fair distribution of work is being made, and at fairly steady prices. One mill secured an order for a 1000-ton of Iron Plates and another secured 1000 tons Skelp, besides which there are inquiries for several hundred tons of Plates and Shapes, which with the usual run of small orders will maintain the *status quo* for the next week or two at all events. Prices are steady, and for small lots are quoted as follows (large lots subject to special arrangement but usually at nearly $\frac{1}{16}$ ¢ less than ordinary rates):

Grooved Skelp.....	1.25¢ @	1.30¢
Standard Refined Bars.....	1.30¢ @	1.40¢
Medium quality.....	1.20¢ @	1.25¢
Tank Steel.....	1.35¢ @	1.45¢
Heavy Plates.....	1.30¢ @	1.40¢
Shell.....	1.50¢ @	1.60¢
Flange.....	1.60¢ @	1.80¢
Angles.....	1.40¢ @	1.50¢
Beams and Channels.....	1.50¢ @	1.60¢

Old Material.—There is a demand at a price, but in most cases at less than holders are willing to accept. Asking prices are about as follows delivered in consumers' yards:

Heavy Melting Steel.....	\$9.50 @	\$10.00
Light Melting Steel.....	7.50 @	8.00
No. 1 Wrought Scrap.....	10.50 @	11.00
Machinery Cast.....	9.50 @	10.00
Wrought Turnings.....	8.00 @	8.50
Cast Borings.....	6.00 @	6.50
Old Iron Rails.....	11.00 @	11.50
Old Car Wheels.....	9.50 @	10.00

Chicago.

(By Telegraph.)

Office of *The Iron Age*, 59 Dearborn street, CHICAGO, July 11, 1894.

Manufacturing operations in this immediate vicinity are checked, and in notable instances entirely suspended, by the railroad strike. The different works of the Illinois Steel Company are shut down for lack of fuel and it is problematical when they will start up again, although everybody hopes that the suspension will be short. The freight situation has improved very considerably within the last two or three days and regular shipments are now going outward, but so far little has been brought in from the East. The situation is clouded by the evident determination of the labor leaders to force out workmen of every description in order to show their sympathy with the railroad strike. This may prolong the struggle indefinitely, which at present looks as though it would be terminated this week.

Pig Iron.—The local manufacturers have again booked a heavy tonnage in the shape of season contracts. Other business has been light, as shipments have been almost completely stopped by the strike. The heavy buying is now about over and a period of comparative inactivity may be expected to set in. Quotations on local Coke Iron are reduced, not because costs have been lowered, but on account of the continued competition for business by the leading producers. Southern Coke Iron is very quiet, even the carload trade being small, while prices are higher, owing to advance in freight rates. Shipments on old orders have been tied up *en route*, much to the annoyance of consumers. Lake Superior Charcoal is in very limited demand and prices are not so strong, except on special brands,

which are well held. Quotations are given as follows for cash:

Lake Superior Charcoal.....	\$14.50 @	\$15.50
Local Coke Foundry, No. 1....	10.75 @	11.00
Local Coke Foundry, No. 2....	10.00 @	10.50
Local Coke Foundry, No. 3....	9.50 @	10.00
Local Scotch.....	10.75 @	11.00
Ohio Strong Softeners No. 1..	13.00 @	13.50
Southern Silvery, No. 1.....	@	.....
Southern Silvery, No. 2.....	@	.....
Southern Coke, No. 2.....	@	10.75
Southern Coke, No. 3.....	@	10.50
Southern, No. 1 Soft.....	@	10.75
Southern, No. 2 Soft.....	@	10.50
Tennessee Charcoal, No. 1....	@	.....
Tennessee Charcoal, No. 2....	@	.....
Alabama Car Wheel.....	17.50 @	18.00
Jackson County Silvery.....	15.00 @	16.00
Coke Bessemer.....	11.25 @	11.50
Malleable Bessemer.....	11.75 @	12.00
Other Ohio Silvery.....	14.00 @	14.50

Bars.—The only business reported during the week was the placing of a very few season contracts. The demand from general consumers has been almost nothing. The mills in this immediate vicinity are now completely idle, but some will start up again as soon as the railroad situation permits. Meanwhile prices show some indications of firmness; mills which ended their fiscal year on July 1 found that none made money and some have lost, and they are not disposed to continue their policy of taking contracts almost regardless of prices. Mill shipments of Common Iron made from Old Rail mixture are selling at 1.05¢ @ 1.10¢, Chicago, but Iron of guaranteed quality is quoted at 1.15¢. Soft Steel Bars from strictly Billet stock are firmly held at 1.30¢ @ 1.35¢, Chicago. Jobbers quote small lots from store at 1.30¢ upward for Iron and 1.50¢ upward for Soft Steel Bars.

Structural Material.—Manufacturers of Building Shapes are not finding any large jobs in sight, but small work seems to be increasing. Apartment houses, hotels, store buildings, warehouses, &c., are rather more numerous than for any time since early in the spring. Local yards are now getting well cleaned up and in a very short time will be completely out of stock if railroad blockade is not lifted. Quotations on mill shipments, Chicago delivery, are as follows: Beams and Channels, 1.50¢; Tees, 1.65¢; Angles, 1.45¢; Universal Plates, 1.45¢. Small lots from stock sell at 1.90¢ @ 2.25¢ for Beams and Channels; 1.50¢ @ 1.60¢ for Angles, and 1.70¢ @ 1.80¢ for Tees.

Plates.—Manufacturers' agents are at a disadvantage in not being able to promise shipments, as railroads running out of Pittsburgh will not take freight for Chicago at present. Even the jobbing business here has been cut down heavily during the week by the inability to ship, while the city trade has been flat. Prices are unchanged. Mill shipments, Chicago delivery, are quoted as follows: Tank Steel, 1.45¢ @ 1.55¢; Flange Steel, 1.65¢ @ 1.10¢; Fire Box, 1.65¢ @ 5¢. Store prices are as follows: Iron or Steel Sheets, Nos. 10 to 14, 1.80¢ @ 1.90¢; Tank Steel, 1.65¢ @ 1.85¢; Flange Steel, 2.10¢ @ 2.35¢; Boiler Tubes, in carloads, 70 % @ 75 % off.

Sheets.—Some little demand is noted for both Black and Galvanized Sheets. The settlement of the wage scale again enables mill agents to canvass the trade, but prices appear to be held firmer and buyers are slow to place contracts. Mill shipments are quoted at 2.40¢ @ 2.45¢, Chicago, for No. 27 Common, 2.50¢ @ 2.55¢ for No. 27 Soft Steel, and 75 and 10 % discount on Galvanized Sheets. Small lots from stock are quoted at 2.70¢ @ 2.75¢ on No. 27 Common, and 75 and 5 % on Galvanized. Sheet Copper is unchanged at 14¢, with no discount.

Merchant Steel.—The only business in progress is the placing of season contracts. Buyers exhibit no particular hurry and a great many concerns are not as yet taking up the matter of contracting for their season's supply. It is likely that this class of business will be spread over the remainder of the summer and extend well into the fall. Mill shipments, Chicago delivery are quoted as follows: Smooth Finished Machinery Steel, 1.65¢ @ 1.75¢; Smooth Finished Tire, 1.60¢ @ 1.70¢; Open Hearth Spring Steel, 1.85¢ @ 1.90¢; Bessemer Machinery, 1.50¢ @ 1.55¢; Bessemer Tire, 1.40¢ @ 1.45¢; Ordinary Tool Steel, 6¢ @ 7¢; Specials, 12¢ and upward.

Billets and Rods.—The Billet market is very quiet, with Billets still quoted at \$18.25 @ \$18.50. Some inquiry is noted for Wire Rods for future delivery and manufacturers are trying to obtain \$25.50.

Rails and Track Supplies.—A few orders for Steel Rails have been entered since our last report, but the tonnage is small. Buyers seem to be waiting for the settlement of the strike. Quotations are continued as follows: Standard Rails, \$25 @ \$27; Steel Splice Bars, 1.25¢ @ 1.35¢; Track Bolts, with Nuts, 2.10¢ @ 2.15¢; Spikes, 1.75¢ @ 1.80¢; Links and Pins, 1.65¢ @ 1.70¢.

Old Rails and Car Wheels.—In the absence of business quotations are nominally continued at \$10.50 @ \$10.75 on Old Iron Rails; Old Steel Rails \$6.75 @ \$9.50, according to length; Old Car Wheels, \$10 @ \$10.50.

Scrap.—A few transactions have taken place in Wrought Scrap and in cheap material, but merely enough to show that trade is not actually dead. Dealers quote the following selling prices per net ton: Railroad Forge, \$9; Dealers' Forge, \$8 @ \$8.50; No. 1 Mill, \$6.50; Pipes and Flues, \$6; Iron and Steel Axles, \$13 @ \$13.50; Heavy Cast, \$7 @ \$7.50; Stove Plate, \$5 @ \$5.50; Fish Plates, \$10; Horseshoes, \$9; Mixed Steel, gross ton, \$5.50.

Metals.—Everything in this line is extremely quiet, with Lake Copper in carload lots quoted at 9½¢, Casting Copper 9¢ @ 9½¢, Spelter 3.25¢ and Pig Lead 3.20¢. The Lead supply is extremely short and a considerably better business is expected as soon as the railroad embargo is lifted.

While the World's Fair buildings which were burned last Thursday evening comprised seven of the leading buildings, the Columbian Exposition Salvage Company will still have a large number of buildings to wreck. They have left no less than 14, among which are the Transportation, Fisheries and Woman's buildings, which were classed among the main buildings, as well as the Forestry, Shoe and Leather, Anthropological and other large structures. The great arches of the Manufactures building were completely leveled, owing to the burning of the heavy timbers forming their foundations. To the same cause can be ascribed the collapse of other structures with steel frame work. Part of the Machinery Hall arches are standing. A curious feature of the fire was the almost total destruction of the "staff," or outer covering. Nothing was left of it but fine sand. The officers of the company figure that the loss sustained on the lumber burned will probably be more than covered by the labor saved on wrecking the great buildings, as the iron and steel frame

work is now in such shape that it can easily be handled, but it will be useless for any other purpose than Scrap. From the best information obtainable it is believed that the fire was started in the Terminal Building by railroad rioters who were aiming to destroy cars which were standing there and on tracks in the vicinity. They succeeded in their purpose, but destroyed a great deal more than they probably anticipated.

Pittsburgh.

(By Mail.)

Office of The Iron Age, Hamilton Building, }
PITTSBURGH, July 10, 1894. }

Although the great railroad strike has not yet reached Pittsburgh its effects have been severely felt, and the past week has been extremely quiet. The policy of hand to mouth buying continues, and as one maker put it, "A 500-ton order looks as big as a mountain." Railroads centering here are refusing to receive consignments for many Western points, and many think we will yet have a tie up in this district. Outside of a round block of Bessemer for delivery during the next three months, there have been no transactions worthy of special mention. The Coke strike still hangs on, the old hands still refusing to return to work while the results attained from negro labor imported into the region are far from satisfactory. Finished Material continues in light demand, with prices about as they were a week ago.

Pig Iron.—With the Coke strike still on and nearly all the Coke being made coming to Pittsburgh, furnaces in the Valley district are making little headway in the direction of resuming operations. The probability that it may be some little time yet before a general resumption among the furnaces will take place has had the effect of stiffening prices to some extent and \$11.75 to \$12, Pittsburgh, for Bessemer Pig for the next three or four months are minimum prices. For July delivery \$12.50, Pittsburgh, for Bessemer is being obtained, with the supply very limited. Inquiries are a little better for Foundry Iron, but sales are still confined to 50 and 100 ton lots. Gary Forge is in light demand, but the supply is limited; two of the Valley furnaces are reported as holding for \$10 at furnace, equal to \$10.65, Pittsburgh. We have advanced quotations on Bessemer Pig and for forward delivery we quote as follows:

Neutral Gray Forge.....	\$9.85 @	\$10.00, cash
All-Ore Mill.....	9.75 @	10.00 "
No. 1 Foundry.....	11.75 @	12.00 "
No. 2 Foundry.....	10.75 @	11.00 "
Bessemer.....	11.75 @	12.00 "

We note a sale of 10,000 tons of Bessemer for delivery during July, August and September at \$11.15 at Valley furnace, equal to \$11.75, Pittsburgh. Also two sales of Bessemer of 500 tons each for July delivery at \$12.50, Pittsburgh, and several small lots, ranging from 50 to 100 tons, of Nos. 1 and 2 Foundry, at prices equal to about \$12, Pittsburgh, for No. 1 and \$11 for No. 2.

Billets.—A slightly better inquiry for prompt Steel is reported, and there have been a number of sales during the week of lots ranging from 100 tons to 500 tons. Prices quoted by the mills are somewhat higher than those quoted by some of the brokers, and there is an impression that some Steel has been sold short. For prompt delivery some mills

ask \$18 @ \$18.50, and a sale of 1000 tons made early last week was at the last named price. During this week, however, sales subject to delivery after operations have been resumed have been made at \$17.50, at mill, and a sale of 800 tons for early delivery at \$17.25, at mill, is reported. Nothing is being done in Steel for forward delivery, as most of the buyers have some Steel still due them at low prices and do not care to make additional contracts at present prices. The Bellaire Nail Works have arranged a Steel scale with their employees for July and August, and expect to start up on Monday, July 16. The Laughlin & Junction Steel Company and Shenango Valley Steel Company have held conferences with their men, but no agreement has yet been reached.

Plates.—A fair amount of business is being placed, but is altogether for small lots. For round lots 1.20¢ is being done on Tank Plate. We quote as follows: Tank Plate at 1.25¢ @ 1.30¢, Shell at 1.40¢; Flange, 1.45¢; Ordinary Fire Box, 2½¢ @ 3¢; Railroad Fire Box, 3.35¢ @ 3.40¢.

Structural Material.—No large contracts were placed during the week, but there is a steady demand for small lots, which foots up a very respectable tonnage. It is denied that 1.25¢, Pittsburgh, on Beams is being shaded. We quote as follows: Beams and Channels in round lots, 1.25¢ at mill. In small lots we quote at 1.30¢ @ 1.40¢, according to order. We quote Angles and Universal Plates at 1.20¢ @ 1.35¢, according to order, and Tees, 1.35¢ @ 1.40¢.

Ferromanganese.—We note a sale of 25 tons of domestic at \$53, delivered at buyer's mill.

Bars.—The demand continues light, but most of the mills are doing something and some of them have a fair amount of work on hand. The great railroad strike is charged with being responsible for the holding back of a number of orders that would have been placed before this had the trouble not occurred. Valley mills continue to quote 1.05¢ at mill for Iron Bars, while Steel Bars may be quoted at 1.10¢ @ 1.15¢.

Muck Bars.—Sales are confined to 50 and 100 ton lots, and even these are not plentiful. We quote at \$19.75, Pittsburgh, for best grades.

Merchant Steel.—The demand is only moderate, but several season contracts are reported as under negotiation and are expected to be closed within a few days. Prices show no material change and we quote as follows: Bessemer Machinery, 1.35¢; Open Hearth Machinery, 1.45¢ @ 1.55¢; Open Hearth Spring, 1.65¢ @ 1.70¢; Cold Drawn Steel Shafting, 2.40¢, base; Tool Steel, 5¢ @ 7¢ for ordinary grades; extra grades, 11¢ @ 13¢.

Sheets.—The Sheet scale was settled here in conference last week after a continuous session lasting nearly 18 hours. The scale as agreed upon is practically that which appeared in *The Iron Age* of June 21. The Amalgamated Association agrees to another conference in case the duties are materially lowered when the tariff bill passes. A number of the mills are still closed for repairs, but will start within the next few weeks. We quote No. 27 Common Iron at 2.35¢ and 2.45¢ for Steel. The demand for Galvanized Iron continues good, and we quote 75 and 10 % cff for round lots.

Wire Rods.—No sales are reported; the shutting down of so many Wire Nail mills has broken off some negotiations that were on last month. The Rod mill of Baackes & Co., at Cleveland, is undergoing extensive repairs and improvements, and the capacity will be increased to 200 tons per day.

Barb Wire.—The demand continues very light, but orders for fall trade are expected to come in within the next two or three weeks. We quote Four-Point Galvanized at \$2.05 @ \$2.10, and Plain at \$1.40, in carload lots.

Wire and Cut Nails.—The demand for Wire Nails is light and altogether for small lots. The broken condition of stocks is causing a firmer feeling in prices and some mills are refusing to quote below \$1.15 for the usual averages. Cut Nails are also in light demand, but stocks are very much reduced. We quote at 95¢ at mills for 55¢ averages.

Pipes and Tubes.—The Pipe trade is in very fair condition, some mills reporting an excellent trade for last month. Prices are firm with the exception of Boiler Tubes, which are showing a slight weakness. Makers state that while they are getting higher prices than ruled several months ago, the advance has not been sufficient to cover the increased cost of Skelp. The Youngstown plant of the American Tube and Iron Company is running double turn in all departments, while the plant at Middletown is also running full in most departments.

Iron and Steel Skelp.—An order for 800 tons of Grooved Iron Skelp was placed last week. Prices are without change, and we quote as follows: Grooved Steel Skelp, 1.15¢ @ 1.20¢; Sheared Steel Skelp, 1.25¢ @ 1.30¢; Grooved Iron Skelp, 1.25¢ @ 1.35¢; Sheared Iron Skelp, 1.40¢ @ 1.45¢.

Connellsville Coke.—A visitor to the Connellsville region yesterday reports that the situation is fully as bad as one month ago, and from present indications the strike may drag along for a month or more yet. While it is true that the output of Coke is being increased every day, yet it is at a fearful cost, one prominent operator stating that it costs him \$3 for every ton of Coke he is turning out. Negroes from the South are being sent into the region in large numbers and are being paid \$1.50 per day and given their board and lodging. Deputies cost \$3.50 per day and captains \$6 per day, and in connection with the restricted output, it can be seen that the lot of the operators just now is not a pleasant one. A leading operator is reported as booking contracts for Coke for delivery up to October 1 at \$1 per ton, while for balance of the year \$1.10 is the ruling figure. A number of contracts have also been placed on the basis on 10 tons of Coke, or more, for 1 ton of Bessemer Pig Iron, depending upon the location of the furnace.

Cincinnati.

(By Telegraph.)

Office of *The Iron Age*, Fifth and Main Sts. }
CINCINNATI, July 11, 1894. }

There has been rather more Southern Coke Iron available during the week, and there were increased deliveries on old contracts, which gives an undertone of easiness to the market, but the demand was mainly for single car lots with an occasional inquiry for as much as 500 tons. The demand for No. 1 and No. 2 Soft continues in excess of

the ability of the furnaces to promptly supply. The coal miners' strike is gradually being adjusted, and the production of Pig Iron is increasing in the South, but the troubles of the railroads restrict the arrivals and makes them very irregular and uncertain. Consumers in this district are melting about as much Iron as usual of late, the Iron Pipe works and the agricultural works being the largest, while the jobbing foundries are doing comparatively little. There has been a fair demand from the East for Southern Iron, but unless the labor troubles are speedily settled there will be greater demoralization than ever in the Iron trade. Quotations are as follows:

Foundry.

Southern Coke, No. 1.....	\$10.25 @ \$10.50
Southern Coke, No. 2.....	9.50 @ 9.75
Southern Coke, No. 3.....	9.25 @ 9.50
Ohio Soft Stone Coal, No. 1....	14.50 @ 15.50
Ohio Soft Stone Coal, No. 2....	14.00 @ 14.50
Lake Superior Coke, No. 1.....	12.50 @ 13.00
Lake Superior Coke, No. 2.....	11.50 @ 12.00
Hanging Rock Charcoal, No. 1....	16.00 @ 17.00
Hanging Rock Charcoal, No. 2....	15.50 @ 16.00
Tennessee Charcoal, No. 1.....	13.00 @ 13.50
Tennessee Charcoal, No. 2.....	12.00 @ 12.50

Car Wheel and Malleable Irons.

Standard Southern Car Wheel	16.25 @ 17.00
Lake Superior Car Wheel and Malleable.....	16.25 @ 16.75

Forge.

Gray Forge.....	8.75 @ 9.00
Mottled Coke.....	8.50 @ 8.75

Birmingham.

BIRMINGHAM, July 9, 1894.

The railroad strike has reached here and is liable to cause considerable inconvenience to the furnaces. The Louisville & Nashville, Alabama Great Southern and Kansas City railroads were the first affected. The Georgia Pacific is so far entirely free from trouble. They have notified all furnaces that their Eastern connections are wide open, though the Western are subject to delays. If the strike continues on the other roads all raw material supplies are liable to be shut off. The plants dependent on the Louisville & Nashville and Alabama Great Southern will be the principal sufferers. These two roads do most of the raw material business. One concern proposes to use its own engines, manned with its own crews, to get the raw materials on the roads tied up. As most of these lie within 15 miles of the furnaces this is perfectly feasible. Only one concern is not affected by the strike, as it possesses its own railroads to its raw material supplies. Should the strike continue, the furnaces will load up all available cars with Pig Iron for shipments and hold them until after the tie up. In this way stocks will not increase, and buyers can expect prompt shipments when freights move again. There is danger that the railroad strike may encourage the remaining coal strikers to stand firm, and cause a new complication to the operators. A few more days of quiet would have brought all the striking miners back to work. At several mines the strike was declared off in the last week, and the leaders are discouraged by the severe condemnation of its continuance by the citizens at a recent mass meeting. There is no lack of coal mined, but quality is still off in many cases.

Pig Iron.—The market is in a waiting condition. One of the largest producers claims that there is no market, that prices are set according to stocks on hand and demand. Orders are refused daily and few orders are accepted beyond six months. Shipments are in

carload lots and time orders are for small lots. No large sales are under discussion. Stocks are still decreasing, in fact there are no stocks on hand unsold. No. 1 Foundry is about the only grade on hand. As high as \$10 has been asked for this grade but not accepted. No. 2 Soft commands comparatively better prices, being in great demand. There is a marked difference in market conditions between to-day and two months ago. While prices have not varied much yet the seller was then at the mercy of his customer or his agent, while now he has them in his power, and it is to be hoped can get a raise out of them before long. It is to be hoped that when it comes there will be no cases of heart failure from excess of joy among sellers. Quotations range as follows: No. 1 Foundry, \$8 @ \$8.50; No. 2 Foundry, \$7.50; No. 3 Foundry, \$7; Gray Forge, \$6.75; No. 1 Soft, \$7.50; No. 2 Soft, \$7.25.

Later.—The Governor of Alabama has placed the Union Depot and freight yards in charge of State troops. Passenger trains are arriving fairly regularly, switching is done and freights begin to move. This action will undoubtedly prevent rioting and loss of property, and is of interest as noting the protection afforded corporations in Alabama as against the lack of it in other States.

Metal Market.

Pig Tin.—The movement in prices during the past week has been about the same as that of the preceding one, with 19.25¢ @ 19.35¢ the extremes for current month delivery. Dealings in a speculative way have been extremely moderate and jobbers and consumers have purchased in a perfunctory manner also. In short, the market has been remarkably stationary and the only other interesting feature is that importations have been somewhat in excess of the broadest estimates of consumption. During the first ten days of the month 425 tons were landed, nearly all of which came from British ports. Closing prices were 19.20¢ @ 19.25¢ for early deliveries.

Copper.—There is little change in the condition of the market for Ingot aside from some hardening of prices consequent upon the freight embargo and moderate shipments from primary points. At the moment about 9.15¢ @ 9.25¢ for Lake Superior, 8½¢ @ 8½¢ for Electrolytic and 8½¢ @ 8½¢ for common casting stock would appear to be fair quotations.

Pig Lead.—Western desilverized, for delivery this month, has been sold at 3.50¢ in carload lots and it is difficult to buy spot stock at under 3.55¢, since the quantity available is comparatively small. August shipments from the West are up to 3.40¢ bid delivered here or at common point. The scarcity of ore and fuel serves not only to arouse livelier interest on the part of consumers, but prompts more reserve in the offering by smelters, thus imparting considerably more tone to the market.

Spelter.—Late aggressive sellers are moving with greater caution, since their probable output for some time to come is largely under the control of orders. That fact serves to stiffen prices somewhat, although purchases have been moderate and inquiries very tame in this quarter for some time past. For ordinary Western brands 3.50¢ is apparently the inside price, while 3.55¢ is the more popular quotation.

Antimony.—Merely routine business has been done, chiefly at 8½¢ @ 8½¢ for Hallett's and 10¢ for Cookson's on the spot.

Nickel.—Sales have been made of merely fair sized lots at 40¢ @ 45¢, and those figures represent full market values at the moment.

Tin Plates.—Neither spot goods nor future contracts have been purchased except in a very indifferent way, and the buying interest continues very tame. Prices show little change, but the leaning is more in buyers' favor than in the other direction. Spot prices are as follows: Charcoal: Melyn grade, IC, \$6.25; do., Melyn grade, Crosses, \$7.75; do., Allaway grade, IC, \$5.40; do., Allaway grade, Crosses, \$6.45; do., Grange grade, IC, \$5.50; do., Grange grade, Crosses, \$6.60; do., Terne, M.F., 14 x 20, \$7.25; do., M.F., 20 x 28, \$14.50; do., Worcester, 14 x 20, \$5.70; do., 20 x 28, \$11; Allyn grade, 14 x 20, \$5.15; do., 20 x 28, \$10 @ \$10.25; D. R. D. grade, 14 x 20, \$4.90; do., 20 x 28, \$9.70. IC Coke: Penlan grade, \$5; do., J. B. grade, 14 x 20, full weight, \$5.15; do., 100 lb. \$4.75; do., 95 lb, \$4.62½; do., 90 lb, \$4.55. IC Bessemer Steel, Coke finish: 14 x 20, full weight, \$5.12½; do., 100 lb \$4.70 @ \$4.75; do., 95 lb, \$4.60; do., 90 lb, \$4.50. IC Bessemer Steel, Coke finish, sq., \$5.30. IC Siemens Steel, Coke finish, sq., \$5.45. Wasters: S. T. P. grade, 14 x 20, \$4.60; do., S. T. P. grade, 20 x 28, \$9; do., Albearne grade, 14 x 20, \$4.90.

Financial.

All minor considerations have been overshadowed, during the week under review, by the menace to the peace and prosperity of the country presented by the great labor strikes and the serious disorders and scenes of violence which have disgraced Chicago and other places in the West. The strong arm of the law has been invoked in the maintenance of order, but the sphere of turmoil and trouble has widened rather than diminished, and now threatens to embrace all organized labor throughout the country. That the issue will eventually be in favor of law as against organized lawlessness is an accepted commonplace. But, in the meantime, the business of the country, which was beginning to show symptoms of approaching revival on the nearing settlement of the tariff question, the subsidence of gold exports, and other causes of encouragement, has received a heavier blow than any that has been lately dealt to it; and the effects of which it is impossible to estimate. Already the injury to trade has been immense by the blockade of railroad traffic. The immediate losses to the railroads are severe, and especially so as coming on the top of a lengthened spell of poor business and shrunken receipts. The June reports of gross earnings were fully as unfavorable as had been anticipated, but these must be nothing to what the July exhibit will reveal in the way of shrinkage and losses, incident to the existing state of disorder.

The *Financial Chronicle* computes the gross earnings of 74 railroads for the third week in June at \$5,561,553, a decrease of \$1,388,286, or 19.98 per cent., as compared with the corresponding week in 1893; 30 roads report for the fourth week of June \$4,790,239, a decrease of \$956,091, or 16.64 per cent.; 34 roads report for the month of June

\$17,977,486, a decrease of \$5,162,718, or 22.31 per cent. This exhibit is decidedly poor, especially when it is remembered that the railroads at this time last year were already beginning to feel the first effects of the coming panic in a falling off in freight traffic.

The returns of failures in the United States continue to show a more settled condition of things in the business world. Those for the first week in July are given by *Dun's Review* as 181 in number, against 334 last year. Of these 93 % were of \$5000 or less capital, and only three are reported with capital each in excess of \$20,000. The failures of the second quarter of 1894, according to the same authority, were 2734, against 3199 last year, and the amount of liabilities in commercial failures only was \$37,595,973, against \$63,982,179 in the first quarter of the year, and \$121,541,239 including all reported in the second quarter of last year. There is a heavy decrease in manufacturing liabilities, \$13,421,124, against \$27,954,978 in the first quarter, and also in trading liabilities, \$18,585,792, against \$33,760,186 in the first quarter. Thus in the important classes the commercial failures show a most encouraging improvement during the second quarter, though the half yearly return is large. The aggregate for the half year, 7031 commercial failures, with \$101,578,152 liabilities, has not been surpassed in the first half of any year except the last. There was a great decrease in banking failures, which numbered only 63, with liabilities of \$13,184,461, and in railroad receiverships, which numbered 17, with \$46,800,695 of indebtedness, exclusive of stock.

As a criterion of the business of the country, the volume of bank clearings is usually regarded as reliable. These give a good idea of the falling off of trade during the current year. For the six months ended June 30 they were 29 % less than a year ago, and for the month of June they show a decrease of more than 20 %, as compared with those of June, 1893, although these latter had themselves fallen off 30 %, compared with those of June, 1892.

Money continues to flow into the banks of this city from the interior. Last Saturday's bank statement showed a gain in deposits of \$15,260,500. Loans at the same time increased \$13,709,400, which was a surprise to many who had overlooked the fact that the National Union Bank and the Liberty National Bank were included for the first time in last week's statement, and that the statement embraced temporary advances made here in connection with placing the city of Chicago's new bonds. This accounts for \$3,000,000 and the shifting of two maturing railway loans, accounts for another \$2,000,000, while some large loans were made to the Whisky Trust. The surplus reserve above legal requirements stands at \$72,134,725, a decrease of \$2,668,625 in last week. The call loan market is easy at 1 %. Time money is offered in undiminished supply by the banks and trust companies; but rates are inclined to be firmer. They are quoted as follows: 1 % for 30 days, 1½ % for 60 days, 2 % for 90 days to four months, 2½ % for five to six months. Commercial paper is quiet, owing to the small supply of desirable material in the market. Plenty of second rate paper is offered, but finds little demand. The tendency of buyers has been toward higher rates. Current quotations are 2½ % @ 3 % for 60 and 90 day indorsed receivables; 3 % @ 3½ % for four

month commission house names; $3\frac{1}{2}\%$ @ 4% for prime and $4\frac{1}{2}\%$ @ 6% for good four and six month single names.

Sterling exchange has again strengthened, owing largely to recent large sales of American securities by London and the probable decrease of shipments of goods from this side, owing to the strike. Last week only \$350,000 gold was shipped to Europe, but more will be sent by this week's steamers. Thursday's steamers will take \$600,000 at least and a large sum is almost certain to go on Saturday. The supply of bills continues light. Rates have been marked up twice during the week. Actual business was done on Wednesday at \$4 87½ for 60 days, \$4 88½ for demand, \$4 88½ for cables and \$4 86½ for commercial. Domestic exchange on New York is quoted as follows: New Orleans, commercial 100 premium, bank 150 premium; Savannah, buying par, selling ½ premium; Boston, par @ 5¢ premium; Charleston, buying at par, selling ½ premium; St. Louis and San Francisco, sight 10, telegraphic, 15.

The stock market has exhibited remarkable strength under the adverse conditions of the past week, but prices of securities show no improvement. Most stocks are rather lower than a week ago, but the only wonder is that they have not dropped materially. Sugar furnished most of the dealings last week and is down several points. A steady selling movement of these shares by inside parties is said to have been going on for some time, owing to doubts as to the fate of the sugar schedule of the tariff bill at the hands of the Conference Committee. Chicago Gas has been also a loser, declining two and one half points on Tuesday. St. Paul and Burlington are the only railroad stocks which have shown any semblance of activity. The list generally has been dull, but firm, and apparently unaffected seriously by the condition of affairs in the West. London has been rather a heavy seller within the last few days. The following list shows the fluctuations of the more active stocks during the week, with closing prices on July 11:

	High est.	Low est.	Closing July 11.
Am. Sugar Ref.....	100	94¼	98½
Atchison, T. & S. Fé....	5¼	5	5½
Chicago Gas.....	79¾	72¼	74½
Chic., B. & Q.....	77¼	73¾	74½
Chic., Mil. & St. Paul...	60¾	58¾	59¾
Chic., Rock Isl. & Pac..	67¾	65¼	66¾
Del. & Hudson.....	129¾	126¾	128
Distilling & Cattle Fdg..	24¼	23¼	24½
Gen. Electric.....	37¼	36	36¾
Louisville & Nashville...	45¼	43¾	44¾
Missouri Pacific.....	26¾	25¼	26¾
National Lead, Common.	39	37¼	38½
N. Y., L. E. & Western.	14¼	13¾	13¾
Northern Pacific, Pfd..	14¾	13¾	14¾
Philadelphia & Reading..	17¾	15¾	17
Richmond & West Pt.			
Term.	11½	10½	11½
U. S. Cordage.....	22¼	20¾	21½
Union Pacific.....	11¾	10¾	10¾
Western Union.....	84¼	82¼	84¾

Railroad bonds have been fairly active, but irregular, and closed weak on Tuesday. Municipal mortgages are active and firm, and Government bonds have remained strong and unchanged. Closing quotations on Wednesday were as follows:

	Bid.	Asked.
2's, 1891, registered.....	96	
4's, registered.....	113¼	113¾
4's, coupon.....	113¾	114
5's, registered.....	117¾	118¼
5's, coupon.....	118	118¾

Bar silver is quoted in London at 28½ pence and in New York at 62¼¢ per ounce. Exports of the metal from New York have been fairly heavy during the week.

New York.

Office of *The Iron Age*, 96-102 Reade street, }
New York, July 11, 1894.

Pig Iron.—Buying is on a very restricted scale, and yet reports of low prices made by some Northern and some Virginia furnaces continue to come in. A number of founders in this vicinity have had a good deal of trouble about prompt deliveries of iron on low priced contracts, and have been forced to cover with other parties for prompt delivery at a round advance. The watermelon season is, as usual, interfering with deliveries of Southern iron, the steamers taking the perishable freight and leaving the pig iron behind. We quote standard brands \$12.50 @ \$13 for No. 1; \$11 @ \$12 for No. 2, at tidewater. Southern iron, same delivery, \$11.50 @ \$12.25 for No. 1; \$10.50 @ \$11 for No. 2; \$10 @ \$10.25 for No. 3; \$10.25 @ \$10.75 for No. 2 Soft, and \$10.50 @ \$11 for No. 1 Soft. Foundry No. 4 (Foundry Forge) is \$9.75 @ \$10.25.

Spiegeleisen and Ferromanganese.—Importers have made an effort to draw offers from consumers of Spiegel but have been unsuccessful thus far. Business is quiet in Ferromanganese, which we quote \$52.50 @ \$54 for 80 %.

Billets and Rods.—A sale of 1000 tons of special foreign Billets is reported at private terms. The market for domestic is dull at \$19.50, tidewater, for Billets, and \$26.75 @ \$27 for Wire Rods, tidewater.

Steel Rails.—In standard sections the market is exceedingly dull at \$24.80, tidewater, with no tonnage of any consequence in sight in their territory for the Eastern mills. Competition is again sharp in Light Rails and prices are irregular, \$22.50 up to \$24 being quoted at mill.

Track Material.—We quote as follows for small lots: Spikes, 1.50¢ @ 1.70¢; Fish Plates, 1.20¢ @ 1.40¢; Track Bolts, Square Nuts, 2¢ @ 2.10¢, and Hexagon Nuts, 2.10¢ @ 2.30¢, delivered.

Manufactured Iron and Steel.—No contracts of any consequence for Structural Material have been let during the past week and there is only one really large structure in sight. The volume of business in Plates and Bars is small. There is quite an active inquiry for Cotton Ties, but some of the mills decline to consider any business prior to August 1 and talk of advancing prices. We quote: Beams up to 15-inch, 1.40¢ @ 1.50¢ for round lots; Angles, 1.30¢ @ 1.35¢; Universal Mill Plates, 1.25¢ @ 1.35¢; Tees, 1.50¢ @ 1.60¢; Channels, 1.40¢ @ 1.50¢, on dock. Steel Plates are 1.35¢ @ 1.40¢ for Tank; 1.45¢ @ 1.50¢ for Shell; 1.60¢ @ 1.65¢ for Flange, and 1.75¢ @ 2¢ for Fire Box, and 2¢ @ 2.25¢ for Locomotive Fire Box, on dock; Refined Bars are 1.20¢ @ 1.9¢, on dock, and Common 1.10¢ @ 1.20¢; Soft Steel Bars are 1.20¢ @ 1.30¢; Scrap Axles are quotable at 1.35¢ @ 1.50¢, delivered; Steel Axles, 1.35¢ @ 1.50¢, and Links and Pins, 1.40¢ @ 1.60¢; Steel Hoops, 1.40¢ @ 1.50¢, delivered; Cotton Ties, 70¢ @ 75¢ @ 45-lb bundle, tidewater; Machinery Steel, 1.20¢ @ 1.40¢; Toe Calk, 1.75¢ @ 1.90¢, and Sleigh Shoe, 1.60¢ @ 1.75¢, delivered.

Stock Warrants.—The American Pig Iron Storage Warrant Company have issued the following statement for July 6:

	Tons.
Stock in yard May 31, 1894.....	98,400
Put in yard for 30 days, ending June 30, 1894.....	4,000
Total.....	102,400

Withdrawn, 30 days, ending June 30, 1894..... 1,700

Net stock in yard June 30, 1894..... 100,700

The New Jersey Metal Refining Works of Elizabeth, N. J., announce that they have appointed Saunders, Fielding & Bond, 108 Fulton street, New York, as their commercial agents.

British Metal Market.

[Special Cable Dispatch to *The Iron Age*.]

LONDON, WEDNESDAY, July 11, 1894.

Straits Tin sold up to £69 for prompts and receded to £68. 5/. There was a similar movement in futures. The advance early in the week was due chiefly to support given by the syndicate which has purchased largely of late. Lack of support later on and free selling by other operators caused the reaction, and the market is at present in a nervous condition. Trading to-day was at £87. 15/ for prompts and £68. 2/6 for three months' futures.

Copper depreciated somewhat and subsequently recovered to £39. 7/6 for Merchant Bar prompts, under the influence of improved advices from America. Later there was about 15/ decline from the highest point, due chiefly to heavy offering of G. M. B. prompts. The market is at present at £38. 7/6 for Merchant Bar, prompt delivery, £38 17/6 for do., three months' futures, and £41 @ £41. 10/ for best selected English.

Spelter has advanced to £15. 17/6 @ £16 for ordinary Silesian, and the market is firm in tone although rather quiet.

Pig Lead has advanced to £9. 10/ @ £9. 12/6 for Soft Spanish, and the market is very firm at the advance, but rather quiet.

Tin Plate prices have undergone very little change, and except from Canada inquiries are no better. The market is thus rather soft as well as dull. There are now about 273,000 boxes at Swansea stores. Prices there are as follows:

Bessemer Cokes, 14 x 20.....	@ 10/3
Siemens Cokes, 14 x 20.....	@ 10/6
Ternes, double box.....	@ 19/
Charcoals.....	13/ @ 15/

Exports of Tin Plate last month amounted to 25,000 tons, against 37,000 tons in June, 1893.

Black Plate is in less active demand, and the demand at present is almost wholly from the Continent. Prices have not changed materially.

The movement in prices of Pig Iron warrants has been narrow and the market remains bare of really new features. Late sales were at 41/10 for Scotch, 35/4½ for Cleveland, and 45/ for Hematite.

Exports of Pig Iron last month were 96,000 tons, against 81,000 tons in June, 1893.

Wolff, Zwicker & Buchner bid \$119.-834 for furnishing about 43,000 feet of 18, 20, 24 and 30 inch steel pipe for the Portland, Ore., water works.

Rolling Rods Directly from Small Ingots.

The general manager of the Ougrès Iron & Steel Works, M. Raze, has placed at the disposal of the London *Colliery Guardian* a detailed report upon some basic steel works in Westphalia, written during the present month by a metallurgist from personal inspection. Though not at liberty to give the name of the steel works our contemporary publishes data from it, because it not only describes the method of rolling rods from small ingots, cast in groups, with only a single equalizing heat, but also gives detailed and precise figures as to the cost of turning out steel ingots, billets and finished rods at representative works in the Ruhr district of Germany.

The basic steel works comprise three 5-ton converters, with three cupolas for previously melting the pig, hydraulic plant, and a department for preparing the basic lining of the converters, including a dolomite cupola, edge runners for grinding the dolomite, a mixer, hydraulic apparatus for compressing the dolomite bricks, apparatus for making the converter bottoms, and an oven for drying them when fitted with the tuyeres. A sample is taken from every cast and tested, both hot and cold, and also analyzed in the laboratory. The two hydraulic accumulators work not only the ingot trains but also elevators for raising the finished products to the railway level, and others for lifting the ingots to the level of the heating furnaces. A blowing engine of recent construction is sufficient for blowing the converters; and, in case of repairs, it may be replaced by an old engine. Blast is supplied to the cupolas by Root blowers. The casting pit, which is very long and is served by several hydraulic cranes, has sufficient space for several groups of ingot molds. The casting ladle is worked by a steam crane.

Almost all the ingots are cast in groups and of small sizes, from 50 kg. (1 hundredweight) upwards. This group casting of small ingots is very well arranged and performed. The groups of ingot molds are arranged for receiving the whole contents of a 5-ton converter in a single group. Forty-eight ingots of 100 to 110 kg.—say 2 hundredweight—are cast together. When ingots of half that size are cast their number is increased to 60; and, in that case, the remainder of the metal is poured into other ingot molds. These molds are made for six ingots, so that, for a group of 60, there are, upon the same bottom, ten molds of six ingots, connected together by fire clay channels.

These ingot molds are closed at the top, with the exception of an opening for taking off the gases which are given off by the molten steel. The ingots are very perfect, having rarely bad tops, and they are perfectly suitable for being rolled directly into rods. Moreover, an ingenious arrangement detaches all the runners from the bottoms of the ingots, a result attained by a lateral displacement of all the molds when the steel begins to set. This displacement, which gives the effect of a shearing, is performed by hydraulic pressure. This apparatus supersedes a gang of eight men, which was required to detach the runners, besides facilitating the immediate charging into the furnace of the hot ingots. In this manner the small ingots are scarcely run when they are taken out of the mold and imme-

diately carried to the heating furnaces. There is a third hydraulic lift for taking up the bottoms of the molds, which greatly facilitates the replacing of the groups of molds. The slag from the basic converters, containing about 20 per cent. of phosphoric acid, is sold for manure without being pulverized. The mixture of pig iron adopted, consisting of Luxemburg and Rhenish pig, half and half, contains about 2 per cent. of phosphorus. The following was the cost of producing a ton of basic steel last April:

	M. pf.	M. pf.
1.1323 tons of pig at 42.68 M.*	48.33	
7.0 kg. (15½ pounds) ferro-manganese at 217.17 M.....	1.52	
0.2 kg. (½ pound) spiegeleisen at 51.80 M.....	0.01	
43.8 kg. (96 pounds) runners at 43.67 M.....	1.91	
		51.77
95.1 kg. (1.88 hundredweight) coke at 12.81 M.....		1.22
121.8 kg. (2.4 hundredweight) lime at 10.60 M.....		1.29
13.4 kg. (30 pounds) limestone at 2.90 M.....		0.04
Basic lining.....		1.09
178.2 kg. (3½ hundredweight) steam coal, at 9.18 M.....		1.64
20.3 kg. (45 pounds) ingot molds, at 61.12 M.....		1.24
Wages.....		4.21
Spare parts.....		0.33
Various stores.....		1.63
Water, electric light, &c.....		0.22
General expenses.....		1.56
Sinking fund.....		0.99
Patent rights.....		0.04
		67.27
To be deducted: Runners, &c.	1.06	
Basic slag....	4.60	
		5.69
Total.....		61.58

The outturn in April was 5185 tons for 22 working days, or a mean of 117.841 tons and 26.43 charges per 12 hours; and the mean selling price of the ingots was 64.3 marks, leaving a profit of 2.72 marks per ton. The above cost price may be reduced by increasing the number of charges per 12 hours, as was done in the month of May, when 28 casts were made regularly per 12 hours, which, only reckoning 25 working days, would increase the annual outturn to about 6300 tons, when the cost price of a ton of ingots would be 60.77 marks, or \$15.07, corresponding with a reduction of 0.81 marks per ton, due solely to increasing the outturn. This last price constitutes a difference of a little more than 18 marks between the price of the pig and that of the ingots, which is not excessive, considering that the whole outturn consists of small ingots cast in groups, occasioning an additional expense of about 1.2 marks for special fire bricks and the labor required to make ready the bottoms.

Each roll train has a stand of ingot cogging rolls, a stand of billet rolls and a pair of finishing rolls. Two of these trains are provided with two engines each, one driving the first and the other the second pair of cogging rolls and the finishing rolls. The third roll train has only one engine for driving the three lines of rolls by means of rope gear. In each of these roll trains the three-high ingot cogging rolls are 40 cm. (16 inches) in diameter, and the three high billet cogging rolls 30 cm. (12 inches), with a pair of rolls of the same diameter, while the eight pairs of finishing rolls are 25 cm. (10 inches) in diameter. For each roll train there are shears for cropping the ends of the billets and

cutting them into two or three pieces. For winding up the rod there is a reel driven by rope gearing, and by the side of it a machine for pointing the large rod. The finishing train is provided with channels for turning the rod, as in most German rolling mills, thus reducing by one-half the number of hands for turning the rod with tongs. Two of these trains are erected side by side, but with the final exit of the rod in opposite directions; they are situated quite near the steel works, a circumstance which permits them to receive the hot ingots directly they are taken out of the molds. As the third train is at a greater distance, it rolls the ingots that have been allowed to cool. Each roll train is served by a large continuous furnace. The ingots, still hot from the steel works, are weighed and transported directly to the furnace by means of a table with pulleys running on a wire tramway. When they reach the foot of the furnace a hydraulic lift raises them to the level of the charging door, so that they are charged in without loss of heat.

The ingots are thus rolled into rods at a single heat, which is evidently more of an equalizing process, as in the Gjers soaking pits, than imparting any accession of heat. Ingots of 100 to 110 kg. (say 2 hundredweight) are first rolled into billets of 5 cm. (2 inches) side in the first cogging rolls. The billet thus produced is cropped at the two ends, and then cut into two or three pieces, according to the diameter of the rod required. For rods of 4 8 mm. (0.19 inch) the billet is cut into three pieces, which pass successively through the second cogging rolls and the finishing train. As this rolling is effected very rapidly, pieces lying on the floor plates retain sufficient heat for the operation. If there should happen to be a slight stoppage, and a billet be not quite hot enough, it is placed in the furnaces for a second or two; if, however, the stoppage continues for a certain space of time, the ingot mill will continue to roll billets, which are sold in that state, or small merchant bars. As the trains are provided with clutches, they may be thrown out of gear while the engine continues to run.

This method of rolling ingots directly into rods is evidently more economical than the ordinary method, which consists in rolling the billets in another train, allowing them to cool, heating them and then rolling them into rods. There is a saving of one heat, and therefore of loss in the furnace and of coal, while the transport, loading and unloading of the billets is avoided. The author of the report considers that the quality of the rod thus obtained is good, because he welded several pieces and found them strong and soft on bending, though he felt bound to add that complaints had been made of the quality of rod supplied to some wire works.

The daily outturn of these trains may reach 30 tons in 12 hours, being, of course, greater when large rods are rolled. During the visit 27.5 tons of 4.8 mm. (0.19 inch), and 32 tons of 6 5 mm. (0.256 inch) rods were turned out in 12 hours. The production in April was 2900 tons, and the number of working days was 22. The following is the average price (for the three trains, one of which worked at a disadvantage) of a ton of rod rolled in April last, the ingots being reckoned at cost price:

	M. pf.
1.126 tons of ingots at 61.58 M.....	69.34
151.8 kg. (3 hundredweight) coal for heating.....	
845.8 kg. (6¼ hundredweight) coal for raising steam.....	9.28

* Mark, equal to 24.2 cents. The ton is probably the metric ton of 2204.7 pounds. One mark per metric ton is equal to 24.8 cents per gross ton.

Wages.....	8.74
Various stores.....	1.91
Spare parts, electric lighting, &c.....	0.91
General expenses.....	2.24
Sinking fund.....	1.57

	M.pf.	93.99
To be deducted: Scrap.....	3.41	
Slag or cinder.....	0.70	
	4.11	

Giving the price, per ton of rod, of
(\$22.29)..... = 89.88

The mean selling price of rod in April was 91.18 marks (\$22 61), showing a profit of 1.30 mark (32 cents) per ton. The cost price was in a fair way to be reduced during the following months, owing to an increased outturn and a larger number of working days, while the cost for labor would be reduced in inverse proportion to the production. At the present time all the wages (piece work) are calculated for a daily production of 24 tons; but with one of 27 tons there would be a reduction of nearly 50 pf., or 12.4 cents, per ton.

With the reduced price of 60.77 marks (\$15.07) on account of the steel works, the following cost price is arrived at per ton of rod:

	M.pf.
1.126 tons of ingots at 60.77 marks....	68.43
0.7 ton coal.....	6.51
Wages.....	8.34
Various stores.....	1.93
Spare parts, &c.....	0.89
General expenses and sinking fund....	3.00

Deduct scrap and cinder..... 4.11

Total..... (\$21.08) 84.99

or about 85 marks, which would leave a profit of 6 marks per ton, though it is evident that to attain this price the works must be kept in full swing.

The effect on business of the railroad strike is clearly illustrated in last week's returns of east bound tonnage from Chicago. The total freight carried by all the railroads was under 11,000 tons, the smallest volume of any week for 30 years past, not excepting the famous blizzard week.

Judge Grosscup's Charge.

Judge Grosscup of Chicago, in his charge to the jury, made the following remarks as to the rights of labor:

I recognize, however, the right of labor to organize. Each man in America is a free man, and so long as he does not interfere with the rights of others he has the right to do with that which is his what he pleases. In the highest sense a man's arm is his own, and aside from contract relations no one but himself can direct when it shall be raised to work or shall be dropped to rest. The individual option to work or to quit is the imperishable right of a free man. But the raising or dropping of the arm is the result of a will that resides in the brain, and, much as we may desire that such wills should remain entirely independent, there is no mandate of law which prevents their association with others and response to a higher will.

The individual may feel himself alone unequal to cope with the conditions that confront him or unable to comprehend the myriad of considerations that ought to control his conduct. He is entitled to the highest wage that the strategy of work or cessation from work may bring, and the limitations upon his intelligence and opportunities may be such that he does not choose to stand upon his own perception of strategic or other conditions. His right to choose a leader—one who observes,

thinks, and wills for him, a brain skilled to observe his interest—is no greater pretension than that which is recognized in every other department of industry. So far, and within reasonable limits, associations of this character are not unlawful, but are, in my judgment, beneficial when they do not restrain individual liberty, and are under enlightened and conscientious leadership.

But they are subject to the same laws as other associations. The leaders to whom are given the vast power of judging and acting for the members are simply, in that respect, their trustees; their conduct must be judged, like that of other trustees, by the extent of their lawful authority and the good faith with which they have executed it. No man in his individual right can lawfully demand and insist upon conduct by others which will lead to an injury to a third person's lawful rights.

The railroads carrying the mails and interstate commerce have a right to the service of each of their employees until each lawfully chooses to quit, and any concerted action upon the part of others to demand or insist under any effective penalty or threat upon their quitting, to the injury of the mail service or the prompt transportation of interstate commerce, is a conspiracy unless such demand or insistence is pursuant of a lawful authority conferred upon them by the men themselves, and is made in good faith in the execution of such authority. The demand and insistence, under effective penalty or threat, and injury to the transportation of the mails or interstate commerce being proved, the burden falls upon those making the demand or insistence to show lawful authority and good faith in its execution.

There is honest leadership among these our laboring fellow citizens, and there is, doubtless, dishonest leadership. You should not brand any act of leadership as done dishonestly or in bad faith unless it clearly so appears. But if it does so appear, if any persons are shown to have betrayed the trust of these toiling men, and their acts fall within the definition of crime as I have given it to you, it is alike the interest, the pleasure and the duty of every citizen to bring them to swift and heavy punishment.

I wish again, in conclusion, to impress upon you the fact that the present emergency is to vindicate law. If no one has violated the law under the rules I have laid down, it needs no vindication; but if there has been such violation, there should be quick, prompt and adequate indictment. I confess that the problems which are made the occasion or pretext for the present disturbances have not received the consideration they deserve. It is our duty as citizens to take them up and by candid and courageous discussion ascertain what wrongs exist and what remedies can be applied. But neither the existence of such problems nor the neglect of the public hitherto to adequately consider them justifies the violation of law or the bringing on of general lawlessness. Let us first restore peace and punish the offenders of the law, and then the atmosphere will be clear to think over the claims of those who have real grievances. First vindicate the law. Until that is done no other questions are in order.

The reply of Chief Arthur of the Brotherhood of Locomotive Engineers to numerous inquiries as to the attitude of that organization toward the strike is both straightforward and sensible.

He is quoted as saying: "Our position in this strike is simply one of non-interference. We will attend strictly to our own business. The Brotherhood of Engineers had nothing whatever to do with this strike, and my advice to engineers is to attend to their business as though nothing had happened and run their engines whenever they can do so with safety." Of course Mr. Arthur is reviled by the Debsites as an agent of the railroad corporations. A few other labor bodies have had the courage to take a similar position.

New Publications.

THE ENCYCLOPEDIA OF FOUNDING AND DICTIONARY OF FOUNDRY TERMS USED IN THE PRACTICE OF MOLDING. By Simpson Bolland. Size 7½ x 5 inches; 535 pages. Published by John Wiley & Sons. Price \$3.

This work, in a great measure, supplies a deficiency which has long existed in foundry literature. The various terms used in foundry parlance are well defined and the different implements necessary to a well organized foundry are clearly explained. The metals most used in founding are treated fully with the possible exception of cast iron, which does not have the space devoted to it that its prominence warrants. The author appreciates the important part aluminum is to play in future founding operations, and has given much valuable information on the subject. The new applications and daily improvements in the manufacture of this metal render it impossible to keep its literature up to date. The value of chemistry to founding is set forth at length under the heading "Analysis." It would have greatly enhanced the value of the author's arguments had he seen fit when speaking of cast iron to give the proper analyses of irons which are suitable for various purposes, thereby giving foundrymen not versed in chemistry a basis on which to work. Such important subjects as sands, fuels and cupolas could have received more complete treatment and thereby add to the value of the book. Venting receives much attention and the information conveyed is valuable. While the references are very full, yet the ordinary reader would be greatly helped by a more complete treatment under one heading. The article on cupolas may be cited as an instance. The list of references is longer than the article itself. Under the title of "Technical Education for the Molder," the author seems to see the source from which the ranks of skilled mechanics are to be filled. It is an acknowledged fact that the number of skilled mechanics has been greatly reduced; but a well organized apprentice system, as suggested by Mr. Cribben in his paper read before the recent meeting of the Stove Manufacturers' Association, would seem a much more feasible plan by which to increase the number of skilled workmen, thereby compelling the selection of foremen from their ranks. It is scarcely to be expected that any increase in the efficiency of the mechanic will prevent the "employment of an educated superintendent," as mentioned by the author as being necessary in some instances, but rather will compel the manufacturer to seek such services. Notwithstanding the criticisms it has seemed proper to make, the book will be an acquisition to any scientific library and be of great assistance to all employed in founding operations.

HARDWARE.

Condition of Trade.

BUSINESS is practically at a standstill, on account of the strike and the consequent feeling of uncertainty which pervades the public mind. It is, however, hoped that the strike will be of short duration and that law and order will soon again prevail with the resumption of normal conditions. Until this matter is settled the trade are naturally holding back their orders awaiting developments. Notwithstanding the fact that this is the dull season, some manufacturing concerns report a very fair business during the month of June, which has continued in at least moderate volume up to the present time. There is little new in the matter of prices, which remain practically as for the past few months on most lines, the market not being at all strong, but a disposition on the part of manufacturers to refuse to go lower being evident. Collections are fair, but there is some complaint in regard to them.

Chicago.

(By Telegraph.)

The railroad strike has overshadowed everything else. It almost suspended business in Shelf and Heavy Hardware. The movement has been mainly local, as it was impossible for salesmen to travel through the Northwest, and shipment of goods for a considerable time could only be made by one line of railroad, as all others were unable to run any freight trains. The railroad situation at present is improving, and nearly all the lines are notifying shippers that they will again receive freight for points along their roads. It is expected that the curtailment of business for the past ten days will cause an active movement for some little time after the railroads are opened. Apprehension exists, however, regarding the proposed sympathetic strike on the part of the general labor unions. Should this occur the situation may radically change and traffic be again completely paralyzed. Reports from the agricultural sections are of an encouraging character, crops being much heavier than had been expected until very recently, and there is every reason to hope for good business after the labor troubles are settled.

St. Louis.

(By Telegraph.)

The railroad strike has paralyzed business during the past week and ship-

ments were almost impossible to make. Even when they were accepted it was impossible to tell when they would leave the railroad yard. Under these conditions any large business was out of the question and the volume of trade for the week has been lighter than for years. Locally the demand is not heavy and jobbers and manufacturers are awaiting the settlement of the strike before making any forecast as to the future. There is no change to note in Pig Iron except that there are no sales to report. Bar Iron, Barb Wire, Wire Nails, Rails and Track Supplies are in the same condition as Pig Iron. Pig Lead is nominally quoted at 3.10 cents, while Spelter is offered at 3.15 cents in small quantities, but finds no buyers at this price.

Notes on Prices.

Wire Nails.—The improvement in the tone of the market in the matter of prices, which was noted in our last issue, still continues and a further advance has been made. The manufacturers are now quite firmly quoting \$1.15 on carload lots at mill. The demand, however, is limited, comparatively few orders being placed. Many of the mills have stopped or are materially diminishing their production. Stocks on hand with the manufacturers are referred to as light. Quotations for small lots from store in New York are \$1.30 to \$1.35.

Chicago, by Telegraph.—Business is at a complete standstill and manufacturers appear to be making no effort whatever to take orders, as their works are shut down and shipments have for some time been out of the question. Quotations on factory lots are, therefore, unchanged at \$1.20 to \$1.25, Chicago. Small lots from stock are still held at \$1.25.

Cut Nails.—In sympathy with the improved condition in Wire Nails a slight advance has been made in the price of Cut Nails, which are now regularly quoted at \$1 to \$1.05 for carload lots on dock in New York. The demand is only moderate. Stocks in the hands of manufacturers are not large, and with the present diminished output are not likely to be materially increased during the next few weeks. Small lots from store in New York are quoted at \$1.10 to \$1.15.

Chicago, by Telegraph.—Almost nothing is doing by manufacturers, as they have been unable to operate their mills on account of their inability to get fuel or to make shipments to customers.

Prices on factory lots are unchanged at 95 cents, Chicago, on 55-cent average. Jobbers quote small lots at \$1.15.

Barb Wire.—There is little to note in the Barb Wire market, the demand, as usual at this season, being light. Prices are without change and somewhat uneven, and represented by the following quotations for Four-Point Galvanized, delivered at the points named: Pittsburgh, \$2.05 to \$2.10; Cleveland, \$2.10 to \$2.15; Cincinnati or Allentown, \$2.25 to \$2.30; Chicago or New York, \$2.25 to \$2.30.

Chicago, by Telegraph.—Manufacturers' agents have been doing little or nothing for some time past. Factories are shut down and shipments are completely checked. No one is disposed to talk of new business. Jobbers continue to quote Galvanized in small lots from stock at \$2.35 to \$2.40, with 10 cents off for carloads.

Portable Stoop Seat.—Magic Introduction Company, 321 Broadway, New York, are offering this article, a description of which appeared in our last issue. The Seat is sold to the trade at \$9 per dozen net.

Magic Self Lighting Lamp Burner.—This article is put on the market by the Magic Introduction Company, 321 Broadway, New York, and was described in our last issue. The Burner is sold to the trade at \$5 per dozen net.

Challenge Family Grinder and Polisher.—This device was described in *The Iron Age* June 28. It is put on the market by the Appleton Mfg. Company, Philadelphia, who are offering it to the trade at the following net prices, terms 30 days:

Case A (containing two dozen without polishing spindle).....	\$10 80
Case AA (containing four dozen without polishing spindle).....	21.60
Case B (containing two dozen with polishing spindle).....	14.40
Case BB (containing four dozen with polishing spindle).....	28.80

Acme Gas Cake Griddle.—Stuart & Peterson Company, Burlington, N. J., are offering this article, which was described in our last issue. The Griddles are sold to the trade from the following list, which is subject to a discount of 10 per cent.:

No.	Price.
1, holding three griddles, capacity 18 cakes at one time.....	\$17.00
2, holding three griddles, capacity 24 cakes at one time.....	19.00
3, holding two griddles, 12 cakes, and one waffle iron, eight cakes.	18.00
4, holding two griddles, 16 cakes and one waffle iron, eight cakes.....	20.00

Aluminum Juice Extractors.—In our issue 21st ult. we illustrated some new Juice Extractors which Silver &

Co., 304 to 310 Hewes street, Brooklyn, N. Y., have recently put on the market. These goods are sold to the trade at the following net prices:

	Per doz.
Aluminum Juice Extractor, Shaker, Strainer and Mixer	\$4.75
Aluminum Lemon Juice Extractor..	2.00
Aluminum Cup Juice Extractor....	2.00

Non-Magnetic Watch.—This Watch was described in our last issue as put on the market by Robert H. Ingersoll & Bro., 65 Cortlandt street, New York. The Watch is sold to the trade at \$15 per dozen net. It is intended to retail at \$2.

Shovels and Spades.—The recent conference between the manufacturers of Shovels and Spades, which was referred to in our last issue, is having a beneficial effect on the market. The action taken, which tends to diminish the very active competition which has prevailed for some time, has had the effect of giving a better tone to prices and some extreme discounts have been withdrawn, while on some goods slight advances have been made.

Cordage.—There has been no further advance in the price of Cordage since our last review of the market. The successive advances enable the jobbers to meet or, if desirable, undersell manufacturers' prices, and consequently the greater part of the trade is in their hands.

Glass.—Present conditions are not favorable to activity in trade, the past week having witnessed a large falling off in business, especially in the West. Now that Glass factories have closed down for two months or more, interest centers about the rules and wages for the next fire. It is not clear what arrangements can be made with Glass workers under the probably altered conditions of tariff, and there appears to be a feeling that some difficulty may be experienced in settlement of the wage scale for the ensuing season. The advantage of the tank system, in the lower cost of producing Glass, over factories using pots is great enough to cause some apprehension as to the possibility of the latter continuing in operation and paying the same scale of wages as the tank factories. The question whether operators in pot factories will be willing to accept enough lower wages to equalize the cost of Glass with that of tank plants, may further complicate the wage settlement. Manufacturers are not making concessions in prices to secure orders, notwithstanding the season of the year nor the possibility of an increased importation of foreign Glass. The impression prevails that when assortments of American Window Glass are so far depleted that the foreign article will be required to make up the deficiency, advantage will be taken of the situation and the price of imported Glass will be advanced on the other side. Manufacturers' quotations on Pittsburgh Glass are reported as being 80 and 10 and 5 per cent. discount.

Letters from the Trade.

Our readers are invited to discuss in these columns questions of trade interest connected with the manufacture or sale of Hardware. We shall be pleased to have a free expression of opinion on subjects deserving the attention of Hardware merchants and manufacturers.

Should They Receive the Letter?

We have received several replies to the inquiry in our issue June 28 as to whether a letter thus addressed:

Messrs. Smith & Smith,
Brooklyn,
Mr. Jones. N. Y.,

should be opened by the firm, Mr. Jones being no longer in their employ. Most of our correspondents take the position that the house would be justified in opening it, and this view seems to be sustained by the opinion of the Post Office Department, which was mentioned in *The Iron Age* of last week. It will, however, be observed that the department recommended that the words "for the buyer" should be used for the sub-address instead of the name as above.

This question is one of more practical importance than perhaps at first appears, inasmuch as not infrequently letters are thus addressed to the traveling salesmen of manufacturing and mercantile houses, who are sometimes perhaps in doubt as to the proper course to pursue. The matter is thus referred to by a prominent jobbing house in Ohio:

We were much interested in the question in your last number in the matter of directing letters to salesmen. Our experience is that delay often happens, and complaints from customers are caused, by the directing to salesmen of letters regarding business matters. The salesmen are usually away for weeks and the letters remain unopened. We often get letters complaining that we do not attend to matters which we know nothing about, as the letter containing it did not come to our attention until long after. We think this is a matter worthy of attention for the general good.

When envelopes containing the cards of customers directed to salesmen are received and they are absent, both the salesmen and the house suffer for neglecting the customers' interest. This is a perplexing question which the customers might solve, if they would direct letters pertaining to business to the house instead of to the salesmen.

A Hardware Association in Texas.

The following letter from a well-known Hardware house in Texas is of interest as indicating the desire on the part of merchants in that State for closer relations. There would seem to be an opportunity to form an association which would be for the benefit of the trade in that great State, and there is little doubt that conference and united action in regard to many trade questions would be advantageous. On this subject our correspondents say:

There is one thing we should be glad to notice in this section, and that is

the bringing together, getting acquainted, &c., of the Southwestern Hardware people. We notice that most sections have associations that bring together the Hardware people of their respective localities, which certainly creates much good feeling, as well as promoting common business interests. Such an association we hope to see among the Hardware jobbers of this great State, and if at a future day we hope at one not far distant.

Warranting Cross Cut Saws.

A Michigan correspondent looks upon the practice of warranting Cross Cut Saws as an evil which should be abolished, and urges that manufacturers who refuse to warrant their goods should be given the preference when orders are placed. After expressing the hope that others may be enough interested to express their views upon the subject, our correspondent remarks as follows:

No doubt most dealers have the same experience in this matter, as the warranty is abused in most cases of returned Saws. The manufacturer expects the dealer to stand between him and the man who uses the Saw. If the purchaser breaks it in setting, twisting or turning on the handles, or, in fact, in most any way short of felling a tree on it, he will swear it is too hard and demand another Saw. The dealer must accede to his demand or lose a customer. That is the unwritten law. The same is true if he imagines the Saw is soft or that it has a flaw. When a man brings a Saw back, he has come to town with the intention of having a new Saw. Right or wrong he wants a new Saw and claims the one returned was defective. The moment the dealer mildly intimates that the Saw is all right, but that the purchaser has not used it right or properly fitted it, he is mad at once, and there is no reasoning with a mad man. It is one of two things: Give him a new Saw or lose a customer. The manufacturers can remedy all this by abolishing the warranty, as Axe manufacturers have abolished warranting Axes. We have no trouble now with Axes, and right here let me say I think all dealers ought to stand by the men who have stopped warranting Axes. If we don't it will not be long before the warrant will be revived. If every little company who come around, offering a warranted Axe are well patronized, it will only hasten the return of the warrant on Axes.

My belief is that goods should be sold on their merits, and if they can't stand on that, they should not be bolstered up with a warranty.

Hints as to Export Trade.

We have received the following communication from the head of a corporation dealing extensively with the leading foreign markets of the globe, as the export representative of a number of American manufacturers whose product for domestic and export trade annually aggregates some millions of dollars. It should carry weight, inasmuch as his experience has come

from personal contact with foreign buyers in their own territory, in numerous trips through various countries consuming months at a time.

In order to show how the average American manufacturer treats an inquiry from a foreign buyer, and to demonstrate how it impresses the customer, I give herewith an extract from a letter just received from a South American correspondent:

"I have tried very hard to get manufacturers in America to send out such complete and definite information with their pictures that I and others here would be able to know at a glance what would be the net cost f.o.b. in New York of the several items covered in their catalogues, and, in addition, the measurement, cubic, packed for ocean voyage. If we knew the cost f.o.b. and the cost of the ocean freight we could then know the cost laid down here. Thus far not one concern in the whole United States have had sufficient energy to grapple with this, or else they have not had sufficient intelligence to know what I have asked for. It always ends in their sending out a more or less attractive catalogue, with a request for a careful examination and a promise 'that they will be pleased to furnish any special information desired on application.'

"Just imagine yourself 8000 miles from New York with one of the catalogues lying on your desk with the information limited to what is now in them! Do you think you would write some one 8000 miles off and wait 90 days for reply? I think not, but if the information was complete, stating cost of each article, packed, placed on vessel, with cubic measurement annexed, you would figure out in two minutes what the cost would be laid down here. You would know what other similar goods were selling for by your competitors, and if there was a dollar profit in sight you would send in orders for goods instead of information.

"Some shrewd man will grasp this one of these days and get increased business from this country."

We might add that this system is now in satisfactory operation by this house. If for any reason impracticable to incorporate this information in the regular catalogue, it can be compiled and sent out as a sheet or pamphlet, as are price currents or discount sheets, merely referring to the page in catalogue and giving number of article. While many manufacturers quote prices "free on board," New York, some do not. If this could be done the foreigner could quickly ascertain the cost of transportation from New York to home port.

European and American Business Usages.

In the following communication, which is from a Hardwareman of wide experience familiar both with the trade in this country and in Europe, reference is made to the very different methods which characterize the different countries:

One cannot help but observe the difference in the methods of business in the various European countries. In England business is transacted with the managing director, who is usually the essence of dignity. He never knows anything about the details of his business—at least he pretends he does not—his confidential man being always at hand to "do" the details.

After business there is usually a chop at the club and some "stout" to wash it down. Incidentally one is ushered into a cab and driven to the managing director's residence, where his good lady is ready to charm the visitor with her refined simplicity, and where the inner man is amply provided with solids and fluids.

In Paris business is usually transacted with the head of the house, who is a master of all details. He talks little, but has a dignified way of impressing upon you the excellence of his product. At his office it is strictly business. There is a refreshing absence of cocktails and cigars, but beware if he invites you to dine with him. It means about 15 courses with as many different wines. It is a task of three hours at least.

In Solingen a good part of the business is transacted in some "beer stube." You can't get a Solinger down to business. He will do it his own good natured way, and if you want his special patterns you can only get them out of him in a social way.

In Liege, Belgium, you transact your business with about five men at a time, who talk collectively and with rapid eloquence, and if your French is limited to *bonjour, monsieur*, it can be imagined how easy it is to get along.

In Westfalen and Thuringen towns a box of cigars is placed at your side and a bottle of Madeira, Malaga or Rhine wine is intended to revive your purchasing spirits.

This is all observed from the purchaser's standpoint.

If a man in Great Britain or the Continent travels to sell goods, he enters with hat in hand, perfectly subdued, and if he should enter with a cigar he may be permitted to remain, but do business—never.

Hardware Organizations.

Mississippi and Missouri Valley Hardware Association.

The annual meeting of this association, which was to have been held on the 10th and 11th inst., at Lake Minnetonka, Minn., has been deferred for a month, the second Tuesday in August having been selected for the opening session. The strike in the West with its tying up of trains necessitated the taking of this step.

Hardware Club of New York.

At a meeting of the Board of Governors held on Tuesday the following new members were elected:

GEORGE R. BIDWELL, New York Tire Company, New York.

JOHN N. BLAIR, 32 Liberty street, New York.

GEORGE H. BURFORD, President United States Life Insurance Company, New York.

C. P. HAUGHIAN, Vice-president Chrome Steel Company, Brooklyn, N. Y.

RICHARD B. KELLY, 237 Broadway, New York.

JAMES S. LEHMAIER, Vanderbilt Building, New York.

H. POWELL RAMSDALL, 1 East Thirty-ninth street, New York.

THEODORE E. STUDLEY, 17 Murray street, New York.

DAVID A. TOWER, Tower Mfg. Company, New York.

Do Manufacturers Sell Goods Below Cost?

THE NOT UNCOMMON PRACTICE of doing business on another's judgment with regard to prices is being severely strained in these times of scant margins. A manufacturer frequently has no reliable method of calculating costs, more especially contingent costs, which are outside of raw materials and productive labor. There are so many elements that enter into the manufacture of merchandise which only cease when the wares are paid for, that many rely largely on conjecture. This system was not so disastrous when profits were greater; but with keen and increased competition more goods are produced, to be sold at a less percentage of advance.

LOSING ORDERS.

A manufacturer naturally dislikes to see a rival secure orders which are rightfully his. The result is that while he may question the propriety of lowering his price, he often argues that if his competitor can afford to take a less price, he can, too. His neighbor may have less expense, better facilities or some natural advantage, or most likely he may err in calculating. The main point is whether or not it is judicious to sell goods which do not return a profit. To be sure there are exceptions sometimes.

IGNORANCE OF COST.

Two instances in the experience of a well-known manufacturer illustrate how easy it is to go astray. The merchant referred to, who has long imported some of the goods, dealt in, while on the streets of Berlin with a manufacturer from whom he bought a certain line of goods, was accosted by another individual who produced the same kind of goods. After the usual courtesies the new comer remarked he would not talk business, as his friend was selling the wares in question for less than he could make them. This led to a challenge to adjourn to a convenient hotel and figure the cost of production, which was promptly accepted, the loser agreeing to pay for the dinners. Every detail and item tallied practically, until the footing was about to be made, when the higher priced man asked his companion what he was going to add for brass, of which the article was made entirely. In other words he had allowed nothing for raw material.

BUYING FROM A COMPETITOR.

The other circumstance concerned a salesman in this country who sold part of the above manufacturer's product. On his return from a trip West he reported the loss of a good order to a competing house on a lower quotation. After much discussion and some misgivings the traveler was authorized to accept an order from his former customer at a reduced price. As it aggregated about 2000 dozens of an article of Cutlery, an experimental lot was made to see if the whole could be executed without loss. Being convinced it could not, an order was placed with the rival concern for the whole lot at a price which showed a profit of 5 per cent. in reselling the goods. The low figure man having his curiosity excited at receiving an order under such conditions investigated the matter and found he had been disposing of his product at less than cost in both instances.

Benjamin Douglas

WE GIVE HEREWITH a portrait of the Hon. Benjamin Douglas, president of the corporation of W. & B. Douglas Middletown, Conn., whose death was noted in our last issue. Mr. Douglas died on Tuesday, 26th ult.

Mr. Douglas was born at Northford, Conn., April 3, 1816, of Scotch ancestry, and was therefore in his seventy-ninth year at the time of his death. His father was a farmer, whose ancestors were among the earliest settlers of New England, as his grandfather was Col. William Douglas, an officer in a New Haven regiment of the Revolutionary War. He acquired the rudiments of his education by a few months' attendance at the district school during the winter while a lad and by extensive reading. Like all farmers' sons, he spent his summers working on the farm. When 16 years of age, or in 1832, he came to Middletown and apprenticed himself to a machinist. In 1839 he joined his brother William, who in 1832 had with W. H. Guild established a machine shop.

For three years they carried on the business of an ordinary foundry and machine shop, manufacturing hydraulic rams and pumps. From the invention in 1842 of the celebrated revolving stand pump, the success of this firm was established. Year after year the business increased until the name of W. & B. Douglas was known the whole world over. The corporation have had a house in New York City for the past 50 years, and their Chicago branch was established some 20 years ago.

Mr. Douglas always attended strictly to his business until his health prevented it, and since then has almost daily been driven down to the factory which he founded. He also found time to devote to public enterprises and works of benevolence. He became early in life an earnest friend of the colored people, and when the war broke out he was prominent among his fellow citizens in the support of the Government.

Mr. Douglas filled many positions of honor and trust in the city and State. He was Mayor of Middletown from 1849 to 1855, and a member of the General Assembly in 1854. While in the Legislature he was known for his broad and progressive views and his businesslike manner in caring for the State's interests. In politics Mr. Douglas was a Republican, having been a delegate at the convention which nominated Fremont and one of the Presidential electors when Lincoln was chosen President in 1860. He also served as Lieutenant-Governor of Connecticut in 1861. He was a mem-

ber of the Board of Education for many years, and helped to establish the schools on their present broad basis.

Mr. Douglas united with the Congregational Church in Northford in 1831 by profession of faith, and joined the South Church in Middletown by letter in 1832. He was for many years its Sunday school superintendent and was a deacon for nearly 40 years.

Mr. Douglas was a director in the Middletown Gas Company and the Air Line Railroad and a director and large stockholder in the People's Fire Insurance Company. He was the first president of the First National Bank, and continued to hold that office until Hon. John N. Camp was elected, since which time he was a director. He was also for years president of the Farmers and Mechanics' Savings Bank, and was for 26 years president of the Middletown Bible Society. He was



BENJAMIN DOUGLAS.

also for many years a trustee of Wesleyan University, and was at his death a trustee of the Connecticut Hospital for the Insane. On his twenty-second birthday, April 3, 1838, he married Mary Adeline, daughter of Elias and Grace Totten Mansfield Parker, and a niece of Major-General Joseph K. Mansfield. She died June 24, 1885. There were six children, of whom three survive—John Mansfield, born in Norwich; William and Benjamin, Jr. Three children have died—Sarah Kirtland, September 21, 1841; Benjamin, December 18, 1843, and Edward, who died in Paris, May 23, 1889.

Mr. Douglas was a pioneer in the manufacturing field, and occupied from the outset a very prominent position as one of the foremost and most successful of American manufacturers. The worldwide reputation and standing which the house of which he was the founder enjoys is a noble tribute

to his industry, perseverance, zeal and integrity.

The story of his life is the story of one who by his perseverance, indomitable will and Christian character, attained a large measure of success, exerted a wide influence for good and had the confidence and esteem of every one who knew him.

The Sale of Athletic and Sporting Goods.

BY SALESMAN.

SOME ONE PERSON should be selected to take charge of this line of goods, who should be expected to inform himself to such an extent as to be able to talk intelligently about them. As a rule, people that use Sporting goods, such as Fire Arms and Ammunition, Fishing Tackle, Tennis and Baseball Goods, Bicycles, &c., are well informed in regard to them, and nothing so quickly repels a person wishing to purchase as an absurd, unreasonable statement made by an ignorant salesman.

READ UP.

A clerk in this position in order to be successful should read articles published by trade journals on this subject, such as *The Iron Age*, *Sporting Goods Gazette*, &c. He should also read the advertisements of manufacturers, send for catalogues, and be able to inform the trade in regard to the latest things made. This is a very progressive line of goods. Something new is what people are all looking for, and new goods must be in stock to keep up trade in this line. The dealer that knows about and gets the new things first is the one that will be the most successful.

READY PRICES.

It is our experience that very much can be done by having a good line of the latest catalogues marked up with net prices in cost mark, so as to be able to give a customer a price at once of goods not carried in stock; but a sample of the goods is still better. The location of a store should govern the amount and kind of goods carried in stock. A good show window well cared for is a very important feature. It should be kept clean, changed often and made attractive with seasonable goods, and with show cards sent out by manufacturers, which can be had for the asking. A window can be made attractive by putting in some mounted birds, animals, horns, &c. Get people in the habit of looking in at your window to see what you have that is new. Be interested and well informed in what you are selling and you will interest other people.

Trade With Latin America.

HON. J. R. G. PITKIN of the Pan-American Permanent Exposition in this city addressed the Merchants' Club of New York, July 10, on the possibilities of trade with South America. Mr. Pitkin was very popular as United States Minister to the Argentine Republic under the last Administration. He pointed out that England's power over the South American market was on the wane, claiming that the Germans had already got from 30 to 40 per cent. of it away from them. In a few special lines like Agricultural Implements, our own manufacturers had secured control of the market. In his opinion South Americans had tired of trading with the English, believing they had made too large profits on their transactions, hence they were eager to find new dealers to trade with. Mr. Pitkin combated the idea that it is necessary to give 12 or 18 months' credit. While European merchants have given long credits they had charged well for it. He said there was much wealth in South American cities and the possessors are quite willing to pay for what they like. The main thing, in his judgment, was to get our goods properly before the people there and be persistent in pushing them. This was especially desirable as our export of breadstuffs is threatened, quoting Chili as having an exportable surplus this year of 6,000,000 bushels of wheat, Australia 12,000,000 bushels, India very much more than ever before, while Argentina has run her surplus wheat from 5,000,000 to 90,000,000 bushels. In the cheaper woollens we could compete with Europe, while in Hardware, wooden ware, rubber goods, vehicles, furniture, clothing, underwear and indeed the greater portion of goods turned out from our factories, we could find a profitable trade with Latin America.

American Axe & Tool Company.

AT THE ANNUAL MEETING of the stockholders of the American Axe & Tool Company the following officers were chosen for the ensuing year: Charles W. Mackey, president; W. T. Norton, first vice-president; F. Q. Barstow, second vice-president; James H. Mann, treasurer; Frank M. Sterrett, assistant treasurer; A. C. Romer, secretary; Gerald Hannay, assistant secretary. It will be noticed that W. T. Norton, formerly secretary, is now first vice-president. He will also act as general manager of the sales department, devoting much of his time to that important branch. The annual report, which was accepted, was considered very satisfactory.

Fire losses in the United States during the month of June are estimated at a little over \$8,000,000, or about half those of the corresponding month of last year. The total loss for the first half of 1894 is placed by the *Journal of Commerce* at \$61,613,200, compared with \$86,000,000 in the same period of 1893.

Fire underwriters are receiving encouragement from this gratifying condition of things, after the long period of severe losses they have experienced.

Trade Items.

WILSON D. LYON, with Sherman & Lyon, exporters, 100 Chambers street, New York, left here July 6, on Norton & Co.'s direct steamer "Strathmairn" for Cape Town, South Africa. He returns to the Cape in the interest of a large number of American manufacturers, represented by this concern, whose goods have either been or are about to be marketed there.

WILLIAM R. GRAEF of Graef & Schmidt, 29 Warren street, New York, who are agents in America for J. A. Henckels Cutlery, is expected back from Solingen in August, having crossed in May last.

CHARLES W. GAUSE, one of the leading buyers of the Simmons Hardware Company, St. Louis, Mo., has recently returned home from a trip East on business connected with the house.

FREDERICK ORGILL of Orgill Bros. & Co., Memphis, Tenn., arrived in New York from the South July 7, bringing his family with him, the intention being to pass some time at the sea shore. He reports the outlook in the South good as to crops and prospective business.

PAUL C. COFFIN, long known as a Hardware merchant in New York, is now doing a general merchandise and Hardware commission business at 191 Chambers street. He deals principally in Machinists' and Railroad Supplies, furnishing much material to many of the various departments of the city government.

J. C. DE BAUN, 124 Chambers street, as New York manager, is now representing the following manufacturing concerns: Barnes Mfg. Company, Phoenix, N. Y., Bench and Amateur Vises, Pipe Vises, Sash and Safety Chain, Door and Check Springs, Mail Boxes, &c.; J. B. Tatem & Son, Eastford, Conn., Chisel Handles, and Mason & Parker, Winchendon, Mass., Bit Braces, Garden Tools, Ice Picks and Hardware specialties.

ATTENTION IS DIRECTED to the advertisement in this issue of Smith's Labor Saving Fillet, of which Smith's Pattern Works, Akron, Ohio, are the sole manufacturers. The Fillet is of leather, designed to put in any corner and to work as easily upon a compound curve as in a straight line. It is easily applied, and its lightness, durability and neatness are referred to.

P. CAVANAGH of Cavanagh & Thompson, 131 Reade street, New York, who went to Europe in May last on a business and pleasure trip, returned to this city July 4 on the "Majestic."

DURING a severe thunder storm on the morning of July 6 the large flag pole on the roof of John Chatillon & Sons' building, 85-89 Cliff street, New York, was struck by lightning. About 8 feet of the top was broken off and split into three pieces. No further damage was sustained.

THE BARNES MFG. COMPANY, PHOENIX, N. Y., with office in this city at 124 Chambers street, have added a new line of steel and malleable iron Clamps to the goods heretofore made by them. They are illustrated and listed in a separate catalogue just issued. The assortment embraces ten different styles aggregating 44 sizes, with openings ranging from 1¼ to 16 inches.

There are malleable and adjustable Screw Clamps, gilt frame, cabinet, handle, machine shop, machinists', machinists', steel fitters', and heavy pattern Clamps. They are referred to as made of the best material and in the most thorough and careful manner.

DURING the flood which recently visited Portland, Ore., the store floor of Corbett, Failing & Robertson's establishment was covered with water from May 28 to June 20, the maximum depth being a trifle over 6 feet. By June 28, however, the floor was dry and they were fast getting the goods down again from the upper floors and in shape. Although working under difficulties during the submerged period, they did business during the whole time.

SMITH'S PATTERN WORKS, Akron, Ohio, are sending to their many customers and friends a Match Safe upon which their leather fillet is ingeniously used in filling up corners on both straight and curved lines. The object of the Match Safe is to show how the fillet can be used on a pattern. The manufacturers remark that they have a large number of customers in the United States and Canada who have adopted the fillet.

JAMES H. WATTERS of Watters & Martin, Norfolk, Va., is in New York on business connected with that house. Mr. Watters was one of the delegates to the late Hardware convention in Richmond.

JULIUS BERBECKER of Julius Berbecker & Co., who recently returned from Europe in response to a cable announcing the destruction by fire of their New York warehouse, will, after the adjustment of their fire losses, return to Europe and complete the business interrupted by the fire. He expects to go back in August. The company are about to vacate the temporary quarters secured at 64 Reade street. Hereafter they may be found at the Stewart Building, 280 Broadway, Room 291. When they are able to secure suitable lofts in which to transact their business they will establish themselves permanently. Meanwhile they are executing orders promptly from their factories, shipping small lots for city and near by trade from stock in this city. This concern are the selling agents of William Schollhorn Company, New Haven, Conn., and Tucker Mfg. Company, Waterville, Conn.

Price-Lists, Circulars, &c.

J. R. CLANCY, Syracuse, N. Y.: Redfield's Sure Grip Hose Clamp. A circular illustrates and describes the Clamp, which is made of wrought steel, for hose from ½ inch to 1¼ inches in size. The maker states that the construction of the Clamp offers a true inner circle before and after tightening.

GRISWOLD MFG. COMPANY, Erie, Pa.: Erie Ware. An illustrated pamphlet is devoted to descriptions and prices of American Dampers, American Damper Clip, Waffle Irons, Aluminum Kettles and Tea Kettles, Double Broilers, Safe Heads and Gem Pans. The last page of the pamphlet is detachable for use as a postal card in requesting quotations.

WALTER W. WOODRUFF & SONS, Mount Carmel, Conn.: Carriage Goods. A catalogue and price-list shows a large line of these goods, including Rim Bands, Shaft Tips, Pole Crabs and Tips; Neck Yoke and Whiffletree Tips, Carriage Door Handles, Buggy Seat Handles, Screw and Shackle Clamps, Coach Hinges, Coach Locks,

Top Props, Felloe Plates, Brass Eagle Heads, Ox Shoes, &c.

F. E. KOHLER & Co., Canton, Ohio: Post Hole Diggers, Hardware Specialties, &c. Catalogues A, B, C and D, each devoted to a line of goods, illustrate, with descriptions and prices, Post Hole Diggers, Hardware Specialties, Household Necessities and Curry Comb Specialties.

BROWN & WALES, 69-83 Purchase street, Boston, Mass.: Metals and heavy Hardware. A serviceable and comprehensive catalogue of nearly 300 pages is devoted to a line of goods including Iron and Steel, Heavy Hardware, Tin Plate, Sheet Iron Tank Plates, Angles, Tees, Blacksmiths', Machinists' and Tinnners' Supplies, Corrugated Iron, Steel Roofing, Sheet Brass and Copper, Brass and Copper Tubing, Sheet Zinc, Solder, Babbitt Metals, &c. The volume is very thoroughly illustrated, contains full price-lists and table of sizes and other essential information.

It Is Reported—

Colorado.

That the capital stock of the Tompkins Hardware Company, successors to the Tompkins-Cary Hardware Company, LEADVILLE, has been reduced to \$50,000.

Illinois.

That Samuel Jordan has purchased the interest of Mrs. Leembuis in the Hardware firm of Leembuis & Schulte, FREEPORT.

That G. G. Shearer is preparing to start in the Hardware business at MIQUON.

Iowa.

That the Stuhr Hardware Company, NEOLA, have commenced excavating for the erection of their new buildings. One will be of brick and iron and the other a frame structure.

That A. B. Craven's Hardware store, at KELLOGG, was robbed on the 21st ult. The stolen goods were subsequently recovered and the thieves placed under arrest.

That Ackerman & McClain's Hardware store, at FREMONT, was destroyed in a large fire at that place on the 26th ult. The loss is estimated at \$6000.

That T. C. Ballew is erecting a new Hardware establishment at HUMESTON.

That the Lowell Hardware Company of JANESVILLE, WIS., who bought out the stock of W. Trigg & Co. of AURORA, ILL., have sold it to H. Sarr of BELVIDERE, who has removed the stock to BELVIDERE.

Kansas.

That Odenwelder & Evans are successors to Evans & Co., Hardware merchants, PLEASANTON.

That H. A. Williams, Hardware and Implement dealer, LOUISBURG, has sold out to J. W. Brallman.

That W. T. Wilhoit of WILLIS has admitted his son to partnership in the Hardware business, the firm style becoming Wilhoit & Son.

That the Hardware and Implement firm of Barry Bros., DOWNS, has been dissolved and is succeeded by W. A. Barry.

Louisiana.

That A. Bronsard has succeeded J. Marchaud in the Hardware business at ST. PHILLIPS.

Massachusetts.

That the store of A. V. Fletcher, dealer in Stoves and Tinware, ATHOL, was burned out on the 2d inst. The loss sustained is in the neighborhood of \$2000.

That in a large fire at HUDSON, on the 5th inst., the Hardware establishment of Holden & Robinson was consumed. While the store was

still in flames the members of the firm gave orders for a fresh stock of goods, and they are already in a position to supply many of the wants of their customers.

Minnesota.

That Louis Albrecht of GLENCOE has purchased the Hardware stock of J. C. Root of BROWNTON.

That on the night of the 27th ult. the Hardware store of Geo. Johnson, at CANTON, was robbed of \$40 worth of Revolvers and Knives.

That Huntington Bros. is the style of a new Hardware firm at LUVERNE. They are the successors to C. E. Huntington.

That the Hardware firm of Stone & Dumble, MORRIS, has been dissolved. The business will hereafter be carried on by A. A. Stone.

That Fred. Eikhoff will soon open a Hardware store at ST. HILAIRE.

Missouri.

That the Chandler Hardware Company have bought out S. E. Snapp's business, at EXCELSIOR, and entered upon possession. Mr. Chandler is from CEDAR RAPIDS, IOWA.

That Mayberry & Sullivan are successors of D. P. Mayberry in the Hardware business at BLUE MOUND.

That the Berryville Hardware Company, BERRYVILLE, have sold out to W. R. Hinchman.

New York.

That Cole & Brace, Hardware merchants, of JORDAN, have purchased ground on which they will erect a new block, a portion of which they will occupy on completion.

That the Rochester Hardware Company, ROCHESTER, have been organized with a capital of \$10,000. They will do a general wholesale and retail business. The directors of the company are T. T. Smythe, B. V. Park, George J. Mears and Edward B. Vincent, all of ROCHESTER.

North Carolina.

That the copartnership heretofore existing between Julius Lewis and N. W. West under the firm name of Julius Lewis & Co., RALEIGH, was dissolved by mutual consent on June 30, Mr. Lewis having sold his entire interest in the firm to N. W. West, Charles B. Hart and F. T. Ward. Messrs. West, Hart and Ward have formed a copartnership under the style of the Julius Lewis Hardware Company and will continue the business at the old stand. Mr. Lewis has been identified with the Hardware field for a long period, the last 27 years of which have been passed in RALEIGH.

Pennsylvania.

That W. V. Taylor has admitted John A. McKinley to partnership in his Hardware and House Furnishing goods business at 349 and 351 Beaver avenue, ALLEGHENY. The new firm style is Taylor Hardware Company.

South Dakota.

That D. Bryden of FAULKTON has commenced the erection of a new store.

Tennessee.

That E. S. Cordell has purchased the Hardware store of John Cordell & Co., HUNTSVILLE.

Texas.

That E. Welburn, Hardware and Implement merchant, of PARADISE, has recently erected a large store and residence building combined.

That Thompson & Stollenwick of ITASCA will enlarge their store and add a full line of Hardware to their line of Farm Implements, Wagons, Buggies, &c.

The Hardware trade throughout the country are requested to report business changes, improvements and other matters of trade interest suitable for mention in this department.

Paints and Colors.

It should be understood that the prices quoted in this column are strictly those current in the wholesale market, and that higher prices are paid for retail lots. The quality of goods frequently necessitates a considerable range of prices.

White Lead.—A certain amount of importance is attached to the fact that Pig Lead for prompt delivery is scarce and commanding a stiff premium, at which offers are being made for August and later shipment. The importance, however, is not sufficient to prompt free buying of White Lead and its influence elsewhere does not extend beyond affording basis for argument as to why prices for White Lead should not improve. But prices for the pigment seem to be governed by something else than the cost of raw material and show no improvement whatever. The various brands of old Dutch process, new process and mixed Leads may be had at prices as low as any that have ruled at any time during the past two or three months. Fresh concessions do not, however, appear to have been made recently.

Red Lead.—There is somewhat free offering of foreign brands and not a little evidence that some importers are naming prices more or less under the figures generally quoted. It does not appear, however, that the best inducements have stimulated business, although American producers have done something in the nature of arousing buying interest by meeting the offers of their foreign competitors. Pending developments, the market is unsettled and rather weak.

Litharge.—There is hardly anything doing outside of routine business and deliveries on old contracts. Neither glass nor rubber manufacturers are in the market and Paint jobbers buy in a hand-to-mouth way. Prices have undergone no decided change, but are still rather weak.

Orange Mineral.—Fair sales have been made of French stock for future delivery at prices in the neighborhood of 10¢ @ 10¼¢, laid down here. Otherwise the movement has continued slow and prices have undergone no radical change.

Zincs.—Nothing new has developed in the market for foreign Oxide, and it looks very much as though late offers at low prices restricted rather than expedited business. There have, however, been no fresh concessions the past week. Domestic brands are moving at about the same prices that have ruled for a week or two, but rather slowly, and the demand is rather below the average for this season of the year.

Oils and Turpentine.

Colors.—No radical changes in prices of dry Colors have taken place, nor have any new moves been made that change the complexion of affairs in any branch of the market. Such as it is, the business passing is at about the old line of prices. Oil Colors have met with only routine sale, and while some stock of doubtful quality goes at low figures goods of recognized merit seem to be holding their own.

Linseed Oil.—Rumor has it that there has been some sly cutting of prices by out of town crushers and that orders for lots of 10 barrels or more were filled at 53¢. The leading Western producers stand firmly at 54¢, while no concession from last week's figures is made on city brands of raw or boiled oil.

Cotton Seed Oil.—There has been a fairly good seasonable demand, particularly for refined product of prime quality. This has led to some harden-

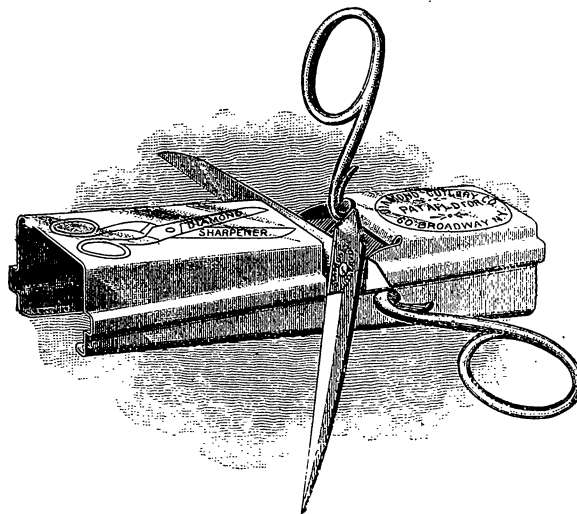
ing of values, but quotations are not positively higher than those that were generally quoted last week.

Miscellaneous.—In other lines there has been merely routine business and prices have undergone no important change.

Spirits Turpentine.—Prices have receded to about 30¢ for regular and 30½¢ for machine barrels, but at the modified rates more business was done and the market is now quite steady.

Diamond Sharpener.

Diamond Cutlery Company, 60 Broadway, New York, are offering the scissors sharpener herewith illustrated. It is composed of a nickeled metallic case, with grooved runways at the sides in which is a short file. A guide is provided in the opening of the case, against which the inside of the blade of the shears is held while drawing it across the file. The manufacturers warrant the device to sharpen shears so that they will cut the finest fabric or the thinnest tissue paper perfectly. When the file becomes dull it may be slid along to bring an unused portion in contact with the blade of the shears, and when one side of the file is worn out the file may be inverted. Extra files will be supplied by the company when desired.



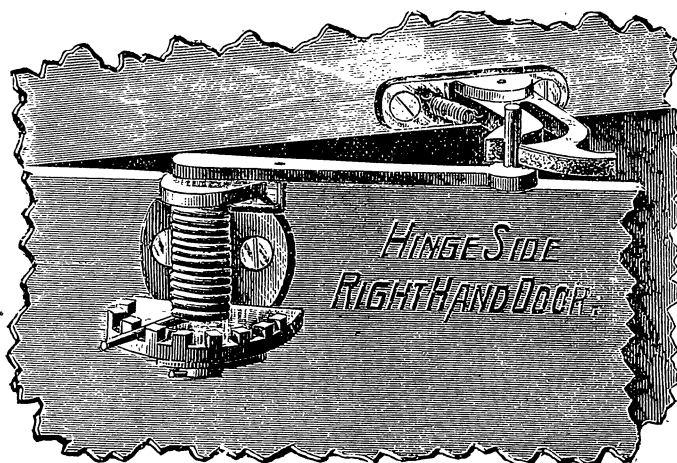
Diamond Sharpener.

nuts through which they pass into the handle. The handle is of thoroughly seasoned hardwood, well finished. The

vided with three bits, nicely finished and well tempered, of different sizes, to enable the operator to select one to fit

The Cycloid Screen Door Check.

Enterprise Mfg. Company, Canandaigua, N. Y., are offering the check here shown. The check consists of an arm connected with an adjustable coiled spring in a frame which is screwed to the door, and a stop plate on a buffer, which is screwed to the door jamb. The arm moves with the door, and the buffer moves in a plane parallel with that of the movement of the door, to permit the action of the device to be in perfect accord with the easy swing of the door. The manufacturers state that while the check is designed for use on screen doors it may be used on any door closed by springs. The company send a sample check, express charges prepaid, upon receipt of 50 cents.



The Cycloid Screen Door Check.

The Jones Reversible Spiral Screw Driver.

The accompanying cuts represent a reversible spiral clutch screw driver

action of the spiral is reversed so as to drive screws or to withdraw them, by slipping the knurled band on the cylin-

any size screw he may wish to use, each screw driver and bits being packed in a strong wooden box. The tool is recom-

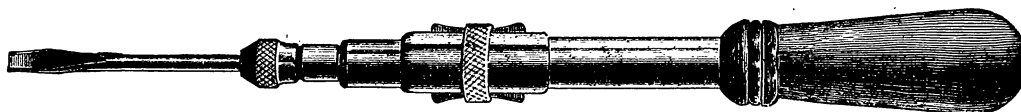


Fig. 1.—The Jones Reversible Spiral Screw Driver.

being offered by the Alford & Berkele Company, 77 Chambers street, New York, for F. A. Howard, Belfast,

der forward or backward as the case requires. The tool is designed more especially for light and rapid work,

mended by the company for the use of machinists, gun and locksmiths, cabinet makers, coffin makers, carriage makers,

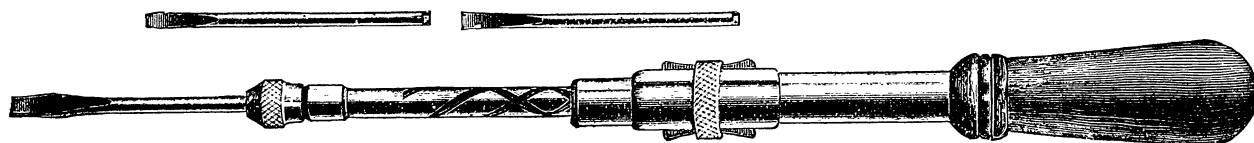


Fig. 2.—Spiral Screw Driver Extended.

Maine. In construction the knurled nut of the clutch is made of steel, the socket of steel, and also the spindle,

and may be used as a spiral or ordinary screw driver; so that if it is found that a screw cannot be driven or withdrawn

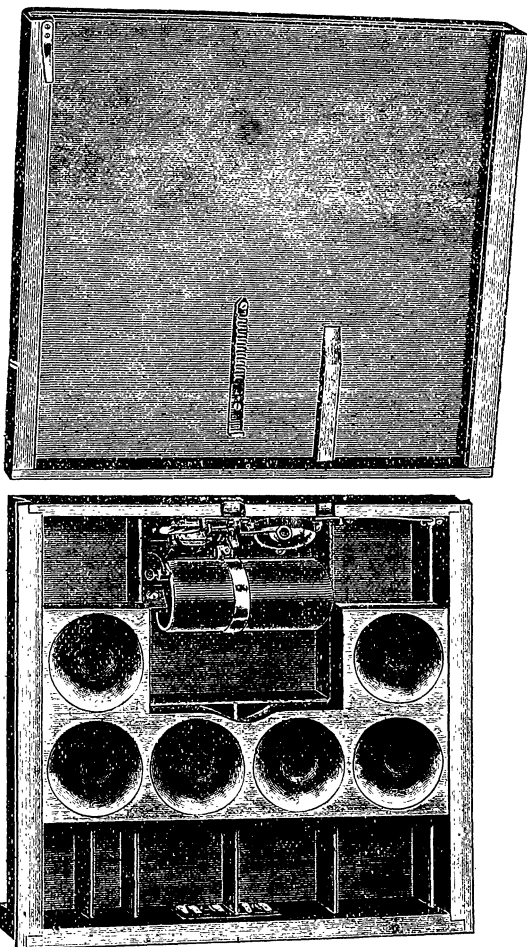
piano and organ makers, and all who have large numbers of screws to drive and draw.

The Johnson Electric Alarm Cash Drawer.

The Johnson electric alarm cash drawer, which is herewith illustrated, is offered by the manufacturers to the

keys which have been set are touched the circuit is broken in the combination and the drawer may be opened without any noise, but if the proper keys are not touched the bell will ring and the drawer will lock if an attempt is made to open it. Connection can be made

the regulation cash drawer. It is manufactured by the Western Electric Company, 227 South Clinton street, Chicago, and Thames and Greenwich streets, New York.



The Johnson Electric Alarm Cash Drawer.

trade with great confidence in its merits and advantages. It is constructed on entirely new ideas and has many desirable features.

The illustration shows both the drawer and the under side of the lid. The drawer has a combination in front of five keys connected in multiple with the circuit, together with a bell and lock and a dry battery. The battery being in the drawer, the actuating mechanism is all self contained. The keys are reached from the under side of the front of the drawer and extend up into the drawer, where they are set. Those set are externally indistinguishable from those not set. To set the keys, or change the combination, it is merely necessary to lift out of its place a covering slide inside on the front of the drawer, and throw the keys aside with the fingers. There are 32 combinations by which the drawer can be set. The arrangement for locking the drawer is very ingenious. A pawl, pivoted from the bell casting, is released by the downward movement of the bell hammer and engages in the teeth of the rack shown on the lid. The drawer will remain locked until it is entirely closed again. It will lock if left partially open, and the bell will give a continuous alarm when an attempt is made to open the drawer. This is a unique feature of the Johnson drawer, as other alarm cash drawers, when partially open, will neither ring nor lock. If the

with the switch and bell from any part of a building as a night alarm. The dry battery will last for an indefinite

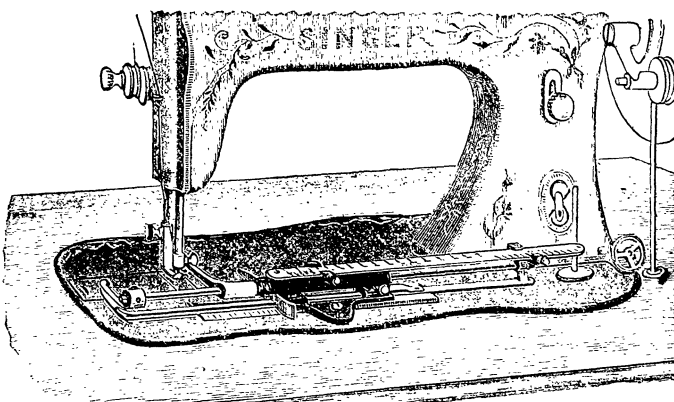
time, as it is expected that in regular use the bell will not often be rung. It will be observed that there is very little

The Perfection Tuck Marker.

W. A. Wilson, Rochester, N. Y., is putting on the market a tuck marker, as represented in the accompanying cut. The marker, which is described as being made of the best material, is fastened to the sewing machine base by a single screw, holding it in a fixed position, it being unnecessary, it is stated, to tighten or loosen the screw for any purpose other than its application to or removal from the machine. The point is made that the mode of fastening the marker to the machine avoids unnecessary jar and wear on the attachment or on the machine on which it is used. The marker has a range including tucks from $\frac{1}{4}$ inch in width up to those of 2 inches, including a 1-inch space. The adjustment is accomplished, it is explained, by means of two screws on the "tuck and space" scale located on the upper part of the attachment, and in plain view of the operator. The screw on the left is used when marking tucks and that on the right where space is desired between tucks. The manufacturer claims that the marker throws no extra wear on the machine to which it is attached; that it does not affect the operator of the machine in any particular, and that it enables the operator with a glance and turn of screw to instantly change from one width to another and back again, or to throw any desired space in or out.

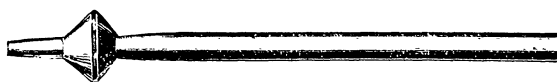
Combination Countersink and Nail Set.

The accompanying cut represents a combination countersink and nail set, offered by the Irwin Auger Bit Company, Wilmington, Ohio. The manufacturers explain that the countersink does not require the use of a brace, but



The Perfection Tuck Marker.

that it is simply driven into the wood, making a smooth, even hole, without any rough edges. It is further stated



Combination Countersink and Nail Set.

mechanism on the lid. The drawer is of the same size and contains the same number and kind of compartments as

that only a few strokes of the hammer are required, and that the tool is equally adapted for use as a nail set.

Home Trainer and Bicycle Stand.

J. H. Marlow, 302 Susquehanna avenue, Philadelphia, is putting on the market the home trainer and bicycle stand shown in use in the accompanying illustration. The device consists of a wrought iron fork having an adjustable hook to receive the bottom bracket of any bicycle and an extension piece



Home Trainer and Bicycle Stand.

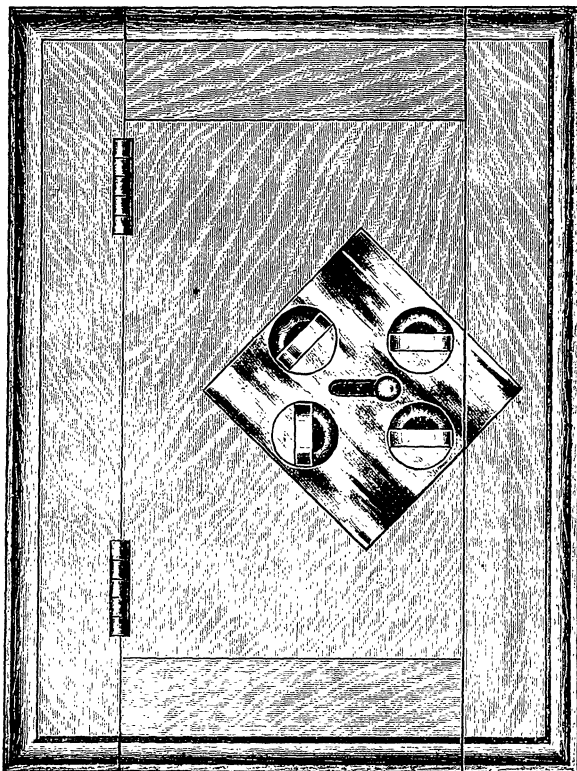
with a turned end, rubber covered, intended to brace the bottom backbone of bicycle. There is a cross bar at the bottom of the fork through which passes rods attached to a wooden friction roller. Nuts on the bars allow of a regulation of the roller contact. The

a bicycle may be rolled to any part of a store without taking it from the stand in order that its motion may be tried.

The Goodhue Lock.

The Independent Electric Company, Thirteenth street and Stewart avenue, Chicago, are offering the lock illustrated in the accompanying cut. This shows a modification of the principle of the

Goodhue cycle lock, illustrated in *The Iron Age* January 18, 1894, as applied to lockers for gymnasiums, clubs, &c., also for post office boxes, as well as for many other uses. By turning the keys to their proper positions the bar may be slipped back and the door opened. It



The Goodhue Lock.

cut shows the device in use as a trainer, the weight of the rider being taken by the bottom backbone, bottom bracket and the two back forks of the bicycle. As a stand for store use the trainer is fitted with ball bearing casters, so that

is stated by the makers that over 4000 combinations may be obtained by using only the most natural positions for the keys, and that by special arrangement this number may be indefinitely increased.

CONTENTS.

	PAGE.
Compound Locomotives.....	47
Large Sheet Metal Cutting or Blanking Dies. Illustrated.....	47
Recent Business Mortality.....	48
The Foundrymen's Association.....	49
The Practical Prevention of Smoke in Boiler Firing by the Use of Producer Gas	52
American Tin Plate List.....	53
List of American Manufacturers of Tin and Terne Plates.....	54
Alphabetical List of Brands of American Tin and Terne Plates.....	55
Press Working of Sheet Metals.—III. Ill..	56
The Boiler Makers' Convention.....	58
Trade Publications.....	59
The Meyers Milling Machine. Illus.	60
Niagara Falls Dynamos.....	61
Correspondence	61
The Week.....	62
Editorials:	
The Northwestern Pig Iron Trade.....	63
The Responsibility of Labor Unions... ..	63
A Little Object Lesson.....	63
Capital and Demagogue Governors....	63
Labor Bears the Burden.....	64
Obituary.....	64
Personal.....	64
A Slight Increase in Pig Production.....	65
The Sheet and Tin Scale Settled	66
Inland Navigation.....	66
Water Tube Locomotive Boilers.....	66
Manufacturing:	
Iron and Steel.....	67
Machinery.....	67
Hardware.....	68
Miscellaneous	68
The Iron and Metal Trades:	
Philadelphia.....	69
Chicago.....	69
Pittsburgh.....	70
Cincinnati.....	71
Birmingham.....	71
Metal Market.....	72
Financial.....	72
New York.....	73
British Metal Markets.....	73
Rolling Rods Directly from Small Ingots.	74
New Publications.....	75
Judge Grosscup's Charge	75
Hardware:	
Condition of Trade	76
Notes on Prices.....	76
Letters from the Trade.....	77
Hardware Organizations.....	78
Do Manufacturers Sell Goods Below Cost?.....	78
Benjamin Douglas. Portrait.....	79
The Sale of Athletic and Sporting Goods.....	79
Trade With Latin America.....	80
American Axe & Tool Company.....	80
Trade Items.....	80
Price-Lists, Circulars, &c.....	80
It Is Reported—.....	81
Paints and Colors.....	81
Diamond Sharpener. Illustrated.....	82
The Cycloid Screen Door Check. Illus.	82
The Jones Reversible Spiral Screw Driver. Illustrated.....	82
The Johnson Electric Alarm Cash Drawer. Illustrated.....	83
The Perfection Tuck Marker. Illus....	83
Combination Countersink and Nail Set. Illustrated.....	83
Home Trainer and Bicycle Stand. Ill..	84
The Goodhue Lock. Illustrated.....	84
Current Hardware Prices	85
Current Metal Prices.....	92

Current Hardware Prices.

JULY 11, 1894.

NOTE.—The quotations given below represent Current Hardware Prices, whether made by manufacturers or jobbers. They apply to such quantities of goods as are usually purchased by retail Hardware merchants. Very small orders and broken packages often command higher prices.

The character @ is used to indicate a range of price: thus discount 50 & 10% @ 50 & 10 & 5%, signifies that the goods in question are sold at prices ranging from 50 & 10% to 50 & 10 & 5%.

Adjusters, Blind—

Domestic..... $\frac{1}{2}$ doz \$3.00, 33 $\frac{1}{2}$ ¢@33 $\frac{1}{2}$ ¢@10%
Excelsior..... $\frac{1}{2}$ doz \$10.00.....50¢@10¢
North's.....list net @ 10%
Zimmerman's—See Fasteners Blind.

Ammunition—See Caps, Cartridges, Shells, &c.

Anvils—

American—

Eagle Anvil, $\frac{1}{2}$ d 9 $\frac{1}{2}$15¢@15¢
Morse shoe brand, Wrought.....11¢@11¢
Moore & Barnes Mfg. Co.....33 $\frac{1}{2}$ ¢

Imported—

Armstrong Mouse Hole.....9¢@10¢
S. & H., machine finished.....30¢@11¢
Trenton.....93¢@101 $\frac{1}{2}$ ¢
Wilkinson's.....101¢@104¢
Peter Wright's.....104¢@111¢

Anvil Vise and Drill—

Allen Anvil and Vise \$3.00.....40¢@10%
Cheney Anvil and Vise.....25¢
Hill's Falls Co., \$18.00.....20¢
Holt's.....40¢@40¢@10%

Apple Parers—See Parers Apple, &c.

Augers and Bits—

Boring Machine Augers.....70¢@70¢@10%
Car Bits, 12-in. twist.....50¢
Common Augers and Bits.....70¢@70¢@10%
Cincinnati Bell-Hangers' Bits.....30¢@10%
Vorster Pat. Auger Bits.....15¢
Jennings' Pattern Car Bits.....40¢
Jennings' Pattern Auger Bits.....80¢
J. E. Jennings & Co., No. 10, extension
lip.....40¢
O. E. Jennings & Co., No. 30.....60¢
C. E. Jennings & Co., Auger Bits, $\frac{1}{2}$ set
82 $\frac{1}{2}$ quarters, No. 5, 5 $\frac{1}{2}$; No. 30, \$3.50, 25¢
Russell Jennings' Augers and Bits, 25¢@10%
Lewis' Patent Single twist.....45¢
L'Hommedieu Car Bits.....15¢@10%
Pugh's Black.....20¢
Pugh's Jennings Pattern.....20¢
Snell's Bits.....60¢@60¢@10%

Bit Stock Drills—

Cleveland.....60¢@10¢
Cincinnati, for wood.....30¢@10%
Cincinnati, for metal.....45¢@10%
Morse Twist Drills.....50¢@10¢
New Process Twist Drill Co.....50¢@10¢
Standard.....60¢@10¢
Syracuse, for metal.....50¢@10%
Syracuse, for wood (wood list).....30¢@5¢

Expansive Bits—

Clark's small, \$18; large, \$25.....35¢@35¢@10%
Ives' No. 4, $\frac{1}{2}$ doz \$60.....30¢@10%
Steer's No. 1, 2 $\frac{1}{2}$; No. 2, 1 $\frac{1}{2}$35¢@40¢
Stearns' No. 2, 4 $\frac{1}{2}$20¢
Swan's.....40¢

Gimlet Bits—

Bee.....25¢@25¢@10%
Common..... $\frac{1}{2}$ doz \$2.50 @ \$3.00
Diamond..... $\frac{1}{2}$ doz \$1.25.....40¢@10%
Double Cut:
Hartwell's..... $\frac{1}{2}$ gro. \$10.00.....40¢@10%
Douglas's.....40¢@10¢
Ives.....60¢@10¢@10¢
Shepardson's.....45¢@10¢@10¢

Hollow Augers—

Bonney's Adjustable, $\frac{1}{2}$ doz \$48.....50¢
Cincinnati Adjustable.....25¢@10%
Cincinnati Standard.....25¢@10%
Douglas's.....33 $\frac{1}{2}$ ¢@33 $\frac{1}{2}$ ¢@10%
French, Swift & Co. (Beecher).....33 $\frac{1}{2}$ ¢@33 $\frac{1}{2}$ ¢@10%

Ives' Expansive, each \$4.50.....50¢@5¢

Stearns'.....20¢@10%
Universal Expansive, each \$4.50.....20¢
Wood's, $\frac{1}{2}$ doz, \$48.....25¢@10%

Ship Augers and Bits—

L'Hommedieu's.....15¢@10¢@15¢
Snell's.....25¢@25¢@10%
Snell's Ship Auger Pattern Car Bits.....15¢@10¢@15¢
Watrous'.....25¢@25¢@10%

Awl Hafts—See Hafts, Awl.

Awls—

Brad, Handled..... $\frac{1}{2}$ gr. \$2.50 @ \$3.00
Brad, Shoulders..... $\frac{1}{2}$ gr. \$1.30 @ \$1.40
Peg, Pat..... $\frac{1}{2}$ gr. 35¢ @ 38¢
Peg, Should..... $\frac{1}{2}$ gr. \$1.50 @ \$1.65
Scratch, Handled..... $\frac{1}{2}$ gr. \$4.00 @ \$4.50
Scratch, Socket..... $\frac{1}{2}$ doz \$1.10 @ \$1.20

Awl and Tool Sets—See Sets, Awl and Tool.

Axes—

First quality, best brands.....\$6.00 @ \$8.50
First quality, other brands.....5.50 @ 6.00
Beveled add 50¢ $\frac{1}{2}$ doz.

Axle Grease—See Grease, Axle.

Axles—

No. 1 Common.....3¢@3 $\frac{1}{2}$ ¢
No. 2 Common.....4¢@4 $\frac{1}{2}$ ¢
No. 7 to 14.....7¢
No. 15 to 28.....47 $\frac{1}{2}$ ¢
No. 19 to 22.....70¢ 3¢ cash
Concord Axles, loose collar.....4¢@4 $\frac{1}{2}$ ¢
Concord Axles, solid collar.....6¢@5 $\frac{1}{2}$ ¢
-ubular Axles.....50¢

Bag Holders—See Holders, Bag.

Balances—

Caldwell, low list.....30¢
Fullman.....60¢

Spring—

Spring Balances.....40¢@40¢@10%
No. 2000 20 30
Chattillon, $\frac{1}{2}$ doz.....\$0.80 0.95 1.75 net
Chattillon Straight Balances.....40¢@40¢@10%
Chattillon Circular Balances.....50¢@10%

Barb Wire—See Wire, Barb.

Bars—

Cast Steel..... $\frac{1}{2}$ d 23¢@3¢
Iron, Steel Points..... $\frac{1}{2}$ d 23¢@24¢

Basins, Wash—

Standard Fiberware, No. 1, 10 $\frac{1}{2}$ -in., \$1.80;
12-in., \$2.00; 13 $\frac{1}{2}$ -in., \$2.50; 15-in., \$3.00.

Beams, Scale—

Scale Beams, List Jan. 12, '82.....60¢@10¢
60¢@10¢
Chattillon's No. 1.....40¢
Chattillon's No. 2.....50¢@10¢@5¢
Custer's.....33 $\frac{1}{2}$ ¢

Beaters—

Bryant's..... $\frac{1}{2}$ gross \$14.00
Double (H. & R. Mfg. Co.), $\frac{1}{2}$ gro., No. 0
\$12.00; No. 1, \$15.00; No. 2.....\$36.00
Dover..... $\frac{1}{2}$ doz \$1.00 @ \$1.20
Dover (Standard Co.)..... $\frac{1}{2}$ doz \$1.00
Duplex (Standard Co.)..... $\frac{1}{2}$ doz \$1.00
Duplex Extra Heavy (Standard Co.)..... $\frac{1}{2}$ doz \$3.50
Easy (H. & R. Mfg. Co.)..... $\frac{1}{2}$ gro \$12.00
Improved Aome (H. & R. Mfg. Co.)..... $\frac{1}{2}$ gro \$9.00
Silver & Co..... $\frac{1}{2}$ gro \$4.25 @ \$4.50
Triple (H. & R. Mfg. Co.)..... $\frac{1}{2}$ gro \$16.50

Culinary—

Keystone, P. D. & Co., Each, No. 1, \$1;
No. 2, \$2.....20¢

Bells—

Common Wrought.....60¢@10¢
Kentucky Durham.....70¢@10%
Kentucky, Sargent's list.....70¢@10%
Kentucky, "Star".....20¢@10%
Texas Star.....50¢@10¢@10¢
Western, Sargent's list.....70¢@10%

Door—

Crank, Brooks'.....50¢@10¢
Crank, Cone's.....10¢
Crank, Connel's.....20¢@10%
Gong, Abber's.....33 $\frac{1}{2}$ ¢@10%
Gong, Barton's.....40¢@10¢
Gong, Yankee.....45¢@10%
Lever, R. & E. Mfg. Co.'s.....50¢@10¢
Lever, Sargent's.....60¢@10%
Lever, Taylor's Bronzed or Plated.....net
Lever, Taylor's Japanned.....25¢@10%
Pull, Brook's.....50¢@10¢

Electric—

Bigelow & Dowse.....20¢@20¢@10%
Wollensak's.....20¢@20¢@10%

Hand—

Extra Heavy Brass.....70¢@10¢@10¢
Light Brass.....70¢@10¢@10¢
Silver Chime.....33 $\frac{1}{2}$ ¢@10%
White.....70¢
Globe Cone's Patent.....25¢@10¢

Miscellaneous—

Call.....45¢@50¢
Farm Bells..... $\frac{1}{2}$ d 24¢
Steel Alloy Church and School Bells.....50¢

Bellows—

Blacksmiths'.....60¢@10¢@10%
Hand Bellows.....40¢@10¢@5¢
Molders'.....40¢@10¢@5¢

Belting, Rubber—

Common Standard.....75¢@10¢@10¢
Extra.....60¢@10¢@10¢
Standard.....70¢@10¢@10¢
N.Y.B. & P. Co., Carbon.....60¢@10¢
N.Y.B. & P. Co., Double Diamond.....60¢
N.Y.B. & P. Co., 1846 Para.....40¢@10%

Bench Stops—See Stops, Bench.

Benders and Upsetters, Tire—

Detroit Perfected Tire Bender 15¢@15¢@10%
Green River Tire Benders and Upsetters.....20¢
Stoddard's Lightning Tire Upsetters.....15¢

Bits—

Auger, Gimlet, Bit Stock Drills, &c.,
see Augers and Bits.

Bit Holders—See Holders.

Blind Adjusters—See Adjusters, Blind.

Blind Fasteners—See Fasteners, Blind.

Blind Staples—See Staples, Blind.

Blocks—

Cleveland Block Co., Mal. Iron.....50¢@10¢@10%
Moore's Novelty, Mal. Iron.....50¢@10¢@10%
Sure Grip Steel, Axle Block.....25¢@25¢@10%
See also Machines, Hoisting.

Boils—

Carriage, Machine, &c.—

Com. list June 10, '84.....80¢@10¢@10¢
Genuine Eagle, Norway, list Oct. '84.....80¢
Eagle, Norway, list Oct. '84.....80¢
Phila. pattern, list Oct. 7, '84.....80¢
R.B. & W., old list.....70¢
Bolt Ends, list Jan. 1, 1890.....80¢@10¢@10%
Machine, list Jan. 1, 1890.....80¢@10¢@10%

Door and Shutter—

Cast Iron Barrel Square, &c.....75¢@10¢@10¢
Cast Iron Chain (Sargent's list).....65¢@10¢@10¢
Cast Iron Shutter Bolts.....75¢@10¢@10¢
Patent Door Bolts.....50¢@10¢@10¢
Wrought Barrel.....75¢@10¢@10¢
Wrt B. K. Flue Common.....60¢@10¢@10¢

Stove and Plow—

Flow.....60¢@10¢@10¢
Stove.....65¢@70¢
R. B. & W., Plow.....55¢
Tire—
Common, list Feb. 28, '83.....70¢@70¢@10%
American Screw Company
Norway, Phila., list Oct. 16, '84.....75¢
Eagle, Phila., list Oct. 16, '84.....80¢
Bay State, list Feb. 28, '83.....70¢
Franklin Moore Co.
Norway, Phila., list Oct. 16, '84.....75¢
Eagle, Phila., list Oct. 16, '84.....80¢
Eclipse, list Feb. 28, '83.....70¢
Port Chester Bolt and Nut Company
Empire list Feb. 28, '83.....70¢
Keystone, Philadelphia, list Oct. '84.....80¢
Norway, Phila., list Oct. '84.....75¢
R. B. & W., Philadelphia, list Oct. 16, '84.....80¢

Boring, Tap—

Common and Ring.....20¢@10%
Clark's.....33 $\frac{1}{2}$ ¢@35¢
Enterprise Mfg. Co.....33 $\frac{1}{2}$ ¢@35¢
Ives' Tap Boring.....33 $\frac{1}{2}$ ¢@35¢

Boring Machines—See Machines, Boring.

Bow Pins—See Pins, Bow.

Boxes, Letter—

Tain's.....40

Boxes, Wagon—

Per d.....24¢

Boxes Miter—

Spiker's Excelsior, 3 in. \$7.50, 4 in.
\$8.50, 5 in. \$13.00, 6 in. \$15.00.....20¢

Braces—

American Bit Brace and Tool Co.
Nos. 10, 12, 20.....60¢@10%
Nos. 11, 21, 24, 27.....70¢@10%
Nos. 22, 23, 25.....60¢@10¢
Nos. 26, 28, 36, 37.....70¢@10¢
Amidon
Barker's Imp'd Plain.....75¢@10¢
Barker's Imp. Nickleled.....65¢@10¢
Ratchet.....75¢@10¢
Eclipse Ratchet.....60¢
Globe Jawed.....40¢@10¢
Corner Braces.....40¢@10¢
Universal 8 in., \$2.10; 10 in., \$2.25
Buffalo Ball.....\$1.10 @ \$1.15
Barber's.....50¢@10%
Bartholomew's.....50¢@5¢
Common Ball, American.....\$1.00 @ \$1.10
Davis.....50¢@10%
Fray's Genuine Sportford's.....50¢@10¢
Fray's No. 70 to 120, \$1 to \$23, 207 to 414
50¢@10¢
Ives' New Haven Novelty.....70¢@70¢
New Haven Ratchet.....60¢@60¢@10%
Barber Ratchet.....60¢@60¢@10%
Barber's Patent.....60¢@60¢@10%
Sportford.....60¢@60¢@10%
P. S. & W. Co., Peck's Patent.....80¢
Roxe & Johnson.....50¢
Saxton's.....75¢@10¢
Barker's Imp. Nickleled.....65¢@10¢
Corner Braces.....40¢@10¢
Ratchet, Nickleled.....40¢@10¢
Buffalo Ball.....\$1.10 @ \$1.15

Brackets—

Shelf, fancy
Sargent's list.....70¢@70¢@10%
Other makes at a wide range of prices.
Shelf, plain
Regular, list.....65¢@70¢
Sargent's list.....60¢@10¢@10%
Bradley Shelf Brackets.....70¢@10%

Bright Wire Goods—See Wire.

Broilers—

Hasting, $\frac{1}{2}$ per doz.....9 10 9 11
Basting, $\frac{1}{2}$ per doz.....\$4.50 5.50 6.50
Morgan Odorless..... $\frac{1}{2}$ doz \$12.50
New Haven.....50¢
Queen City.....33 $\frac{1}{2}$ ¢
Wire Goods Co.....65¢@10%

Buckets, Well and Fire—

See Pails, Galvanized.

Bull Rings—See Rings, Bull.

Butcher's Cleavers—See Cleavers, Butcher's.

Butts—

Cast Brass, Fast.....33 $\frac{1}{2}$ ¢@10%
Cast Brass, Loose Joint.....33 $\frac{1}{2}$ ¢@10%
Cast Brass, Tiebout's.....50¢
Wrought Brass.....80¢@10¢@10%

Cast Iron—

Fast Joint, Broad.....60¢@10¢
Fast Joint, Narrow.....60¢@10¢

Loose Joint, Japanned—

Loose Joint, Jap. with Acorns.....75¢@10¢
Loose Pin, Acorns.....80¢
Loose Pin, Acorns, Japanned.....75¢@10¢
Loose Pin, Acorns, Japanned, Plated Tip.....80¢
Mayer's Hinges.....50¢
Parliament Butts.....50¢

Wrought Steel—

Fast Joint, Broad.....60¢@10¢
Fast Joint, Narrow.....60¢@10¢
Fast Joint, Lt. Narrow.....60¢@10¢
Inside Blind, Light.....50¢
Inside Blind, Regular.....50¢
Loose Joint, Broad.....60¢@10¢
Loose Pin.....50¢
Table Butts, Back Flaps, &c.....50¢
Bronzed Wrought Butts.....50¢@10¢@10%

Cages, Bird—

Hendryx Brass:
3000, 5000, 1100 series.....10¢
2000 series.....40¢
200, 300, 600 and 900 series.....40¢@10¢
Hendryx Bronze:
700, 800 series.....40¢@10¢
Hendryx Enameled.....40¢@10¢@50%

Calipers—See Compasses.

Calks Toe—

Burke's, One Prong, Blunt.....40¢
Burke's, One Prong, Sharp.....40¢
Burke's, Two Prong, Blunt.....50¢
Burke's, Two Prong, Sharp.....50¢
Gautier, One Prong, Blunt.....50¢
Gautier, One Prong, Sharp.....50¢

Can Openers—See Openers, Can.

Cans Milk—

S. S. & Co.: 5-gal., \$3.00; 8-gal., \$4.40;
10-gal., \$4.75 each.....40¢@10%

Cans Oil—

Galvanized Blue Band, 1 gal., $\frac{1}{2}$ doz.....\$2.35
Galvanized Blue Band, 5 gal., Tip-Top.....\$1.00
Galvanized Blue Band, 5 gal., Fancet.....\$3.00
Glass Oil, Friend..... $\frac{1}{2}$ doz \$3.75

Caps—Percussion—

Hicks & Goldmark's and Union Metallic
Cartridge Co.....\$1.00 @ \$1.05
Eley's E. B.....50¢@5¢
Eley's D Waterproof, Central Fire.....50¢
E. B. Grnd. Edge, Cent. Fire, 1-10's 47¢@50¢
E. B. Trimmed Edge, 1-10's.....47¢@50¢
F. L. Waterproof, 1-10's.....35¢@37¢
G. D.....37¢@38¢
Musket, Waterproof, 1-10's.....50¢@55¢
S. B. Genuine Imported.....44¢

Primers—

Berdan Primers, \$1.00.....35¢
B. L. Caps (Sturtevant Shells) \$1.00.....35¢
All other Primers, \$1.20.....35¢

Cards—

Watson's Cotton, Wool, Horse and
File, list January 28, 1891.....25¢

Carpet Stretchers—

See Stretchers, Carpet.

Cartridges—

B. B. Caps, Coll. Ball, Swgd., \$1.85 @ \$1.95
B. B. Caps, Round Ball, \$1.60 @ \$1.65
Blank Cartridges, except 22 and 32 cal.,
additional 10% to above discounts.
Blank Cartridges, 22 cal., \$1.75.....25¢
Blank Cartridges, 32 cal., \$3.50.....25¢
Cent. Fire, Military and Sporting 15¢@25¢
Cent. Fire, Pistol and Rifle.....25¢@25¢
Pinned Shells and Bullets.....15¢@25¢
Rim Fire Cartridges.....50¢@55¢
Rim Fire Military.....15¢@25¢

Carpet Sweepers—

See Sweepers, Carpet.

Casters—

Bed.....Brass.....55¢@55¢@10%
Plate.....Others.....60¢@60¢@10%
Shallow Socket.....40¢@10%
Deep Socket.....40¢@10%
Giant Truck Casters.....35¢
Gwinner's Common Saws.....45¢@50¢
Gwinner's Hercules.....45¢@50¢
Martin's Patent (Phoenix).....45¢@10¢@10%
Payson's Anti-friction.....70¢@70¢@10%
Payson's Truck.....60¢@60¢@10%
Socket Truck Casters.....60¢@60¢@10%
Stationary Truck Casters.....60¢@10%
Trucker's Patent list.....45¢
Yale Casters, low list.....45¢
Yale, Gem.....70¢

Cattle Leaders—

See Leaders, Cattle.

Chalk Lines—See Lines.

Checks, Door—
Bardsley's.....20%
Unity.....0%
Chisels—
Socket Framing and Flrmr
Mix
Ohio Tool Co.....75&10&80%
F. S. & W.....
Whitby.....
Buck Bros.....30%
Charles Buck.....30%
Douglass.....75&10&80%
Merrill.....60&10&20&30&40%
L. & J. White.....30&30&35%
Tanged and Miscellaneous
Buck Bros.....30%
Charles Buck.....30%
Butchers.....75&10&80% to 2
Spear & Jacksons.....\$5 to 2
Tanged Flrmrs.....50&50&10%
L. & J. White, Tanged.....25&35%
Cold Chisels, fair quality, # 14.....14&16%

Chucks—
Danbury.....each, \$8.00.....20%
Graham Patent.....33&4%
Morse's Adjustable, each, \$7.00, 20&20&25%
Byracuse, Balz Pat.....25%
Skinner Patent Chucks.....40%
Combination Lathe Chucks.....40%
Drill Chucks.....20%
Independent Lathe Chucks.....20%
Planer Chucks.....20%
Universal Lathe Chucks.....40%
Union Mfg. Co.....40%
Combination.....40%
Independent.....40%
Universal.....40%
Victor.....\$3.50, 25%
Churns—
McDermald Star Barrel Churn, each 6 gal., \$2.60; 10 gal., \$2.75; 15 gal., \$3.00; 20 gal., \$3.25.
Tithon, Union, each, 5 gal. \$3.25; 7 gal., \$3.75; 10 gal., \$4.25.

Clamps—
Adjustable, Cincinnati.....15&10%
Adjustable, Hammers.....15&15&5%
Adjustable, Stearns.....30&10&10%
Barnes' Machinists' Clamps.....33&4%
Cabinet, Sargent's.....70&10%
Carpenter's, Cincinnati.....25&10%
Carriage Makers', F. S. & W. Co.....40&10%
Carriage Makers', Sargent's.....75&7&5&5%
Eberhard Mfg. Co.....40&5&40&10%
Joiners' Clamps, Tatum's.....25&10%
R. I. Tool Co.'s Wrought Iron.....20%
Saw Clamps, See Vises, Saw Filers
Stearns's Malleable, with Wrought Iron Screw.....70&7&5&5%
Warner's.....40&10&40&10&5%
Cleavers, Butchers—
Beatty's.....40&5&40&10%
Bradley's.....25&30%
Foster Bros.....30%
New Haven Edge Tool Co.'s.....40%
Nichols Bros.....30%
P. S. & W.....33&4&5&5&5%
Schulte, Lohr & Co.....40&40&5%
L. & J. White.....25%
Clips—
Baker Axle Clips.....25%
Norway, Axle.....65&10&5%
Norway Spring Bar Clips.....65&5&5%
Ad grade Norway Axle.....70%
Steel Felloe Clips.....# 1, 70%
Superior Axle Clips.....# 2, 70%
Wrought Iron Felloe Clips.....# 2, 5&4%
Cloth and Netting, Wire—
See Wire, etc.

Cockeyes—
See Keys.
Cocks Brass—
Hardware list (Globe, Kerosene, Lever Bibbs, Racking, &c.).....60&5&60&10%
Coffee Mills—See Mills, Coffee.
Collars Dog—
Brass, Pope & Stevens's list.....40%
Chapman Mfg. Company, new list.....40%
Embossed, Gilt, Pope & Stevens's list.....40%
Leather, Pope & Stevens's list.....40%
Medford Fancy Goods Co.....40&10&50%
Combs Curry—
American Curry Comb Co.....33&4&40%
Fitch's.....50&10&60&10&10%
Gibb's Magnetic.....# doz., \$2.00
Kohler's Hustler.....# doz., \$1.75
Kohler's Magic Oscillating.....# doz., \$2.00
Rubber, per doz., \$1.00.....25%
Compasses, Dividers &c.
Compasses, Callipers, Dividers, 70&10&75%
Bemis & Call Co.'s
Dividers.....65%
Callipers, Call's Patent Inside.....55%
Callipers, Double.....60%
Callipers, Inside or Outside.....65%
Callipers, Wing.....60%
Compasses.....60&5%
Excelsior.....60%
Starratt's
Combination Dividers.....25%
Lock Callipers and Dividers.....25%
Spring Callipers and Dividers.....25&10%
Stevens & Co.'s.....20&10%
Coolers, Water—
S. S. & Co.: 2 gal., \$3.40; 3 gal., \$4.00; 4 gal., \$4.50; 5 gal., \$5.00 each.....00%
Coopers' Tools—
See Tools, Coopers'.
Cord—
Braided, Crown Drab and Fancy, # 5, 55¢
Braided, Crown White, # 5, 50¢
Cable Laid Italian Sash, # 1, 19¢
Common.....# 1, 18¢
Common Russia Sash.....# 1, 12¢
Egyptian, India Hemp, Braided.....# 2, 26¢
India Cable Laid Sash.....# 1, 11¢
Masachuchet, White.....# 2, 22¢
Oneswan Mills
Crown, Solid Braided White.....# 2, 22¢
Crown, Drab and Fancy.....# 2, 24¢
Braided Giant Drab and Fancy.....# 2, 20¢
Braided, Giant, White.....# 2, 20¢
Patent, good quality.....# 2, 10¢
Patent Russia Sash.....# 1, 13¢
Samsom
Braided, Drab Cotton.....# 2, 42¢
Braided, Italian Hemp.....# 2, 40¢
Braided, Linen.....# 2, 56¢
Braided, White Cotton.....# 2, 37¢
Semper Idem, Braided, White.....# 2, 28¢
Silver Lake—
A quality, Drab, 65¢
A quality, White, 55¢
B quality, Drab, 35¢
B quality, White, 30¢
Sylvan Spring, Extra Braided, Drab.....38¢
Sylvan Spring, Extra Braided, White.....34¢
Tate's Solid Braided.....
Economy, Drab.....# 2, 27¢

Economy, White.....# 2, 22¢
Hercules, Drab.....# 2, 30¢
Hercules, White.....# 2, 25¢
White Cotton Braided, fair.....# 2, 28¢
Wire Picture—
Braided or Twisted.....80&10&80&20%
Corkscrews—See Screws, Cork.
Corn Knives and Cutters—
See Knives, Corn.
Crackers, Nut—
Acme.....gro., \$30.....50%
Nickel Plated.....gro., \$30.....10%
Table (H. & B. Mfg. Co.).....40%
Turner & Seymour Mfg. Co.....50%
Cradles—
Grain.....50&2&50&5&2%
Crayons—
White Crayons, # 3 gross.....62&10%
Cases, 100 gr., \$3.75, at factory.
D. M. Steward Mfg. Co.....
Railroad, # 3 gross, \$2.50, 20&25%
Rolling Mill, # 3 gross, 2.50, 20&25%
Soapstone Pencils, # 3 gross, 1.50, 20&25%
See also Chalk.
Creamery Pails—See Pails, Creamery.
Crow Bars—See Bars, Crow.
Curry Combs—
See Combs, Curry.
Cutters—
Meat—
American.....1.....30%
Each.....\$5 \$7 \$10 \$25 \$50 \$80
Enterprise.....10 12 22 32 42
Nos.....\$3 \$2.50 \$4 \$6 \$15
Dixon's.....# doz.....40&40&5%
Nos.....\$14.00 \$17.00 \$19.00 \$30.00
Draw Cut, each:
Nos. 5 2 6 8
\$50 \$75 \$80 \$225.....20&25%
Hale's.....# doz.....70%
Nos.....11 12 13
Home No. 1, # doz.....\$27.00 \$33.00 \$50.00
Little Giant, # doz.....40&10&50%
Nos. 305 310 312 320 322
\$35.00 \$48.00 \$44.00 \$72.00 \$68.00
Miles' Challenge, # doz.....45&45&10%
Nos.....\$22.00 \$30.00 \$40.00
Triumph No. 505, # doz., \$21.00, 25&30%
Woodruff's, # doz.....40&40&5%
Nos.....100 150
Chadborn's Smoked Beef Cutter, # doz., \$65.00
Enterprise Beef Shavers.....20%
Slaw and Kraut—
Tucker & Dorsey Mfg. Co.:
Kraut Cutters, 1 Knife, # gross.....40%
Slaw Cutters, 1 Knife, # gross.....\$21.00
Slaw Cutters, 2 Knife, # gross.....30.00
Tobacco—
Acme.....# doz., \$20.00, 40%
Iron.....# doz., \$2.25
Champion.....# doz., \$2.30
Nashua Look Co.'s.....# doz., \$18.00, 50&55%
National.....# doz., \$21.00, 30%
Sargent's.....# doz., \$24.00, 55&10%
Washer—
Appleton's.....# doz., \$16.00, 60&10%
Bonney's.....# doz., \$20.10, 60&10%
Cincinnati.....# doz., \$25.10, 60&10%
Johnson's.....# doz., \$11.00, 33&4%
Penny's.....# doz., Pol. \$14, Jap. \$16, 55%
Smith's Pat.....# doz., \$12.00, 20&10&10%
Diggers, Post Hole, &c.—
Cronk's Post Bars, # doz. \$60.00,
50&5&50&10%
Eureka Diggers.....# doz., \$10.50, \$12.00
Fletcher Post Hole Augers, # doz., \$30.00,
20&20&10%
Gem, Improved # doz., \$9.00, \$10.00 net
Gibbs' Columbia.....# doz., \$12.00
Gibbs' Hustler.....# doz., \$10.00
Gibbs' Imperial.....# doz., \$7.50
Gibbs' National.....# doz., \$12.00
Gibbs' Post Hole Digger.....# doz., \$12.75
Kohler's Hercules.....# doz., \$14.00
Kohler's Invincible.....# doz., \$12.50
Kohler's Little Giant.....# doz., \$18.00
Kohler's New Champion.....# doz., \$8.00
Ryan's.....# doz., \$20.00, 10%
Samson, # doz., \$34.00.....20&25&10%
Schneider.....# doz., \$18.00
Shimer's Hollow Handle.....# doz., \$24.00
Vaughan's Post Hole Auger, # doz., \$8.50, 50%
Dividers—See Compases.
Dog Collars—See Collars, Dog.
Door Checks—
See Checks, Door.
Door Springs—
See Springs, Door.
Drawers, Money—
Money Drawers, # doz.....\$18&20
Wadell's Improved, No. 1.....# doz., \$15.00
Wadell's Improved No. 2.....# doz., \$18.00
Wadell's Comb, Cutlery Case and Alarm Tilt.....\$12 50
Drawing Knives—
See Knives, Drawing.
Drills and Drill Stocks—
Automatic Boring Tools.....\$1.75&1.85
Bench Drills, Stearns.....\$1.50
Blacksmiths.....each \$1.75
Blacksmiths' Self-Feeding, each \$7.50, 20%
Breast, Bartholomew's.....each \$2.50
Breast, Millers Falls.....each \$3.00, 25%
Breast, P. S. & W.....30&5%
Breast, Wilson's.....30&5%
Chicopee Automatic Drill.....20&10%
Goodell Automatic Drills.....40&5&40&10%
Ratchet, Curtis & Curtis.....30%
Ratchet, Ingersoll's.....25%
Ratchet, Merrill's.....20&20&25%
Ratchet, Moore's Triple Action.....25&30%
Ratchet, Parker's.....20&20&5%
Ratchet, Weston's.....20&25%
Ratchet, Whitney's.....20&10%
Whitneys Hand Drill, Plain, \$11.00, Adjustable, \$12.00.....20&10%
Twist Drills—
Cleveland.....50&10&10%
Diamond, W.....50&10&10%
Graham's Pat. Groove Shank.....50&10&10%
Morse.....50&10&10%
New Process.....50&10&10%
Standard.....50&10&10%
Syracuse (Metal list).....60&10%

Drill Bits or Bit Stock

Drills—See Augers and Bits.
Drill Chucks—See Chucks.
Dripping Pans—
See Pans, Dripping.
Drivers, Screw—
Allard's Spiral, new list.....25%
Brace Screw Drivers.....25&10%
Buck Bros.....30%
Buck Bros' Screw Driver Bits.....27&5&5%
Clark's Pat.....33&4&40%
Cincinnati.....25&10%
Champion.....25&10%
Disston's.....60%
Douglass Mfg. Co.....20&20&10%
Ellrich's Socket and Ratchet.....25&25&10%
Fray's Hol. H. Vile Sets.....No. 3, \$12.00, 45%
Gay & Parsons.....35%
Goodell's Automatic.....50&10&5%
H. & B. Cowles.....70&10%
No. 1.....70&10%
No. 2.....70&10%
No. 3.....60&10%
Nos. 4 and 00, Acme and Ideal.....80&10%
Kolb's Common Sense.....# doz., \$6.00, 25&10%
Mayhew's Black Handle.....50%
Mayhew's Monarch.....45&10%
P. S. & W.....70%
Sargent & Co's
No. 1, Forged Blade.....60&10&10%
Nos. 2, 40 and 60.....60&10&10%
Screw Driver Bits, Part's.....# gross, \$4.25
Screw Driver Bits.....# doz., 50&75%
Stanley R. & L. Co.'s
No. 64, Varmlished Handles.....65&10%
No. 86.....70&10%
Stearns.....25&10&5%
Syracuse Screw Driver Bits.....\$30&30%
C. T. Williamson Wire Novelty Co.....50%
Egg Beaters—See Beaters, Egg.
Egg Poachers—
See Poachers, Egg.
Electric Bell Sets—
See Bells, Electric.
Emery—No. 4 to No. 54 to Flour, CF
48 gr. 150 gr. F.F.F.
Kegs, # 1.....4 1/2 5 3 1/2
Kegs, # 2.....4 1/2 5 3 1/2
Kegs, # 3.....5 6 3 1/2
10 lb cans, 10
10 lb cans, less
than 10.....10 10 8 8
Enamelled and Tinned Ware—See Ware, Hollow.
Escutcheon Pins—
See Pins, Escutcheon.
Escutcheons—
Brass Thread.....60&60&10%
Door Lock.....Same dis. as Door Locks.
Wood.....25%
Expanded Metal—
List No. 5.
Door Mats, Galvanized.....25%
Fencing, Painted Sheets.....20%
Lathing.....10%
Netting, Painted Sheets.....20%
Tree Guards, Panoled.....15%
Window Guards, Panoled.....15%
Extractors, Lemon Juice—
See Squeezers, Lemon.
Fasteners, Blind—
Austin & Eddy, # gr. sets.....\$5.50
Mackrell's, # doz.....\$1.00, 20&20&10%
Security Gravity.....# gr., \$7.50
Van Sand's Old Pat. # gr.....\$5&10%
Van Sand's Screw Pat. # gr.....\$5&10%
Zimmerman's.....50&10%

Faucets

Faucets—
B. & B. Co.
West's Lock, Open and Shut Key.....50%
Burnside's Red Cedar.....50%
Burnside's Red Cedar, bbl. lots.....50&10%
Cork Lined.....70&5&70&10%
Penn's.....40%
Penn's Cork Stops.....33&4%
Penn's Pat. Petroleum.....60%
Metallic Key, Leather Lined.....60&10&10%
National Measuring, # doz., \$36.00 25&10%
John Summers
Peerless Best Block Tin Key.....40%
K.L. test quality, Cork Lined.....50%
Diamond Lock.....40%
Perfection, Fla. Red Cedar (in boxes).....50%
Boss Metallic Key.....50%
Reliable Cork Lined.....60%
O. K. Western Pattern Cork Lined.....50%
No Brand, Red Cedar (in bbls.).....60&10%
Western Pattern Metal Key.....40%
No Brand Metal Key.....60%
Self Measuring
Enterprise, # doz., \$36.00.....25&10%
Lane's # doz., \$36.00.....25&10%
Star.....60%
Star, Metal Plug, new list.....40%
Lockport, Metal Plug, reduced list.....60%
Felloe Plates—
See Plates, Felloe.
Fibre Ware—See Ware, Fibre.
Fifth Wheels—
Brewster.....50&5%
Derby and Cincinnati.....45&5%
Files—
Domestic—
American.....70&70&10%
Arcade.....60&10&10%
G. & H. Barnett (Black Diamond).....60&10&10%
70&10&10%
Eagle.....60&10&10%
Nicholson Files, Rasps, &c. 60&10&10%
Nicholson (X.F.) Files.....70%
Nicholson's Royal Files (Seconds).....25%
(extra prices on certain sizes).
Other makers, best brands.....70&5&70&10%
Fair brands.....75&75&5%
Second quality.....80&80&10%
Arcade Horse Rasps.....60&10&50&10%
Chas. Horse Rasps, Hand Cut.....60&10%
Heller's Horse Rasps.....60&10%
McCaffrey's Horse Rasps.....60&10%
Trojan Horse Rasps.....60&10&5%
Imported—
Butcher.....Butcher's list, 20%
Strubbe's list 25&30%

Fixtures Grindstone

Moore's.....55%
P. S. & W. Co.....60&10%
Reading Hardware Co.....60&10%
Sargent's Patent.....70&10%

Fluting Machines

See Machines, Fluting.

Fodder Squeezers

See Squeezers, Fodder.

Forks

Hay, Manure, &c. Asso. List, 70&70&5&5%
Hay, Manure, &c., Phila. List, 80&80&10&3%
Plated, See Spoons.

Frames—

Red, Polished and Varnished.....# doz., \$1.50, 35%
White Vermont.....# gro., \$9.00, \$10.00

Screen Window and Door

Bonsana Window Screens.....60&10%
Corland.....40&40&5%
Empire Fancy Screen Doors, # doz.....\$12
Phillips' Window Screen Frames.....60&10&50&10&5%
Porter's Pat. Window and Door Frame.....33&4&10%
Stearns' Frames and Corners.....25&25&10%
Wabash Adjustable Window Screen.....40&5%
Warner's Screen Corner Irons.....33&4&10%

Freezers, Ice Cream

American.....60%
Blizzard.....70%
Boss and Pat.....60&10&10&10%
Buffalo Champion.....65%
Confectioners' Machine.....60%
Crown.....60%
Double Action Crown.....60%
Giant.....60%
Good Luck.....65%
Granite State.....65%
Keystone, P. D. & Co., each, \$1.50 20%
Model.....60%
Obol.....60&10%
Peerless.....60&10%
Shepard's Lighting.....65%
Standard.....60%
Standard Double Action.....60%
Star.....60%
White Mountain.....60%
Zero.....70%

Fruit and Jelly Presses

See Presses, Fruit and Jelly.

Fruit Pickers

See Pickers, Fruit.

Fry Pans—See Pans, Fry.

Funnels

Gersdorf's Perfection, Standard and Globe; Ttn. 1 gro., 10¢; 2 to 5 gro., 20¢; 5 to 10 gro., 30¢
Copper, 1 to 6 doz., 15¢; 6 to 12 doz., 20¢; over 12 doz., 25%
Furnaces, Soldering—
Burgess Nos. 3, 4 and 5 Gem, Copper reservoir.....\$3.50
Burgess Nos. 3, 4 and 5 Gem tin reservoir.....\$7.00
Clayton & Lambert No. 1 Fire-Pot, \$8.00; No. 2 Fire-Pot.....\$12.00
Fuse—Dis. 10&25 cash. # 1000 ft.
Common Cotton Fuse, for dry grnd.....\$3.00
Common Hemp Fuse, for dryground.....2.80
Double Taped Fuse, for very wet gr. 5-60
Single Taped Fuse, for very wet gr. 4-75
Triple Taped Fuse, for very wet gr. 6-40
Large Gutta Percha Fuse, for water.....15.00
Small Gutta Percha Fuse, for water.....10.00

Gates Molasses

Boss, # doz.:
No. 1, \$7; No. 2, \$8; No. 3, \$9; No. 4, \$10.
Lincoln's Pattern.....60&10&10%
Stebbin's Genuine.....70&70&10%
Stebbin's Pattern.....60&10&10%
Stebbin's Tinned Ends.....40&10%
Weed's.....20&10%

Gauges

Barrett's Comb, Roller Gauge.....# doz., \$7.50, \$8.00
Hoague & Peck's Champion Gauge, With Scale.....# doz., \$5.00
Without Scale.....# doz., \$4.00
Marking, Mortise, &c.....60&10%
Stanley K. & L. Co.'s Butt and Rabbit Gauge.....25&10%
Starratt's Surface, Center and Scratch Gauge.....45&10&45&10&5%

Glue

Dodd's Liquid Glue.....25&25&5%
Improved Process.....25&25&5%
Le Page's Liquid.....25&25&5%
Upton's Liquid.....35%
Glue Pots—See Pots, Glue.
Grease, Axle—
Axle, tin boxes.....# gross \$12.00
Dixon's Everlasting.....10 lb pails, ea. 8¢
Dixon's Everlasting, in bxs. # doz 1 b
\$1.20; 2 b \$2.00
English Coach, 5-b tin pails, # doz, \$3.50
English Coach, wooden boxes.....# gross \$8.50
Fraser's, kegs, half bbls, or bbl., # b. 3¢
Fraser's, tubs.....# b. 4¢; pails, 5¢
Fraser's, small wood boxes.....# gro. \$9.50
Fraser's 5 b wood boxes.....per doz. \$3.25
Lower grades, special brands.
Tiger, 5-b tin pails.....# gr \$5.50, \$7.00
Tiger, wooden boxes.....# gross \$7.00

Grindstones

Family, regular list.....60%
Family, Cleveland Stone Co.....20%

Grindstone Fixtures

See Fixtures, Grindstone.

Gun Powder—See Powder

Hack Saws—See Saws

Halts

Pat. Pat. Plain Top, # doz.....45&50%
Pat. Pat. Plain Top, # doz.....45&50%
Sewing, Bra's Form, # gr.....\$1.75
Sewing, Pat. Long.....# doz \$1.90
Sewing, Pat. Short.....# doz \$1.50

Snaps, Harness, &c.—
Anchor "P. & S. Mfg. Co." 50¢
Andrews.....50¢
Covett's Saddlery Works Triumph 33¢
Covered Spring.....60¢10¢10¢
Covett.....50¢10¢5¢2¢
Covett, New Patent.....50¢10¢5¢2¢
Covett, New R. E.....60¢10¢5¢2¢
Fitch's (Bristol).....50¢10¢
German, new list.....40¢10¢
Hotchkiss.....10¢
Kelley & Woolworth's Steel Harness.....10¢

John Prots Snaps.....75¢75¢5¢
Sargent's Patent Guarded.....70¢10¢10¢
Snaths—
Scythe.....50¢2¢50¢10¢

Soldering Irons—
See Irons, Soldering.

Spittoons, Cuspidors, &c.
Standard Fiberglass—
Cuspidors, 2½-inch, No. 5, \$8; No. 6, \$9.
Spittoons, Daisy, 3-inch, No. 1, 10 and 11 inch, \$6.

Spoke Shaves—
See Spokes, Spoke.
Spoke Trimmers—
See Trimmers, Spoke.

Spoons and Forks—
Tinned Iron—
Basting, Cen. Stamp, Co.'s list.....70¢25¢
Buffalo, S. S. Co.....39¢42¢
Solid Table and Tea, Cen. Stamp, Co.'s list.....70¢25¢

Silver Plated—
4 months or less 30 days:
L. Boardman & Son.....50¢12¢45¢
Holmes & Edwards Silver Co.....40, 16¢55¢
Meriden Brit. Co., Rogers.....40¢16¢
Reed & Barton.....40¢24¢10¢5¢
Rogers & Bros.....40¢16¢
O. Rogers & Bros.....40¢16¢
Wm. Rogers Mfg. Co.....40, 16¢55¢
Simpson, Hall, Miller & Co.....40, 16¢55¢

Miscellaneous—
Boardman's Britannia Spoons, case lots.....60¢5¢ cash
Boardman's Nickel Silver, list July 1, 1891.....60¢7¢35¢
Britannia, S. S. Co.....60¢60¢5¢
German Silver.....50¢50¢5¢
Nickel Silver.....50¢50¢10¢5¢ cash
Holmes & Edwards Silver Co.....50¢10¢5¢
No. 24 German Silver.....50¢10¢5¢
No. 30 Silver Metal.....50¢10¢5¢
No. 49 Nickel Silver.....50¢10¢5¢
No. 50 Nickel Silver.....50¢5¢
No. 67 Mexican Silver.....50¢10¢5¢
Rogers & Hamilton:
Cimeter, Flatware.....40¢15¢5¢
Cimeter, Steel Goods.....40¢10¢
Crown Hamilton, Flatware and Cutlery.....30¢
Steel Goods.....40¢10¢
Wm. Rogers Mfg. Co.:
18¢ Rogers' German Silver.....60¢6¢
22¢ Rogers' Nickel Silver.....50¢6¢
Rogers' Silver Metal.....50¢10¢5¢

Springs—Door—
Champion (Coll.).....60¢10¢60¢10¢10¢
Cowell's, No. 1, 1/2 doz \$18.00; No. 2, 15.00.
Gem (Coll), list April 10, 1888.....20¢
Hercules.....50¢60¢10¢
Phoenix.....39¢45¢
Rubber, complete, 1/2 doz \$4.50.....55¢10¢
Star (Coll), list April 19, 1888.....20¢10¢
Torrey's Roller.....40¢15¢
Warner's No. 1, 1/2 doz \$1.50; No. 2, \$3.40.....55¢55¢10¢
Victor (Coll).....60¢10¢60¢10¢5¢

Carriage, Wagon, &c.—
Elliptic, Concord, Platform and Half Scoll.....60¢10¢10¢ or net prices
Out's Roller Springs.....25¢

Sprinklers, Lawn—
Gibbs Arc.....1/2 doz., \$12.00
Gibbs Hustler.....1/2 doz., \$6.00

Squares—
Nickel Plated.....30¢10¢10¢85¢25¢
Steel and Iron.....60¢10¢10¢
Avery's Bevel Protractor.....40¢
Avery's Finest Bevel Squares.....50¢
Disston's Try Square and T Bevels.....50¢
Starrett's Micrometer Caliper Squares.....25¢
Winterbottom's Try and Miter.....30¢10¢

Squeezers—Fodder—
Blair's.....1/2 doz \$2.00
Blair's "Climax".....1/2 doz \$1.00

Lemon—
Porcelain Lined, No. 1.....1/2 doz \$6.00

Wood, Common.....1/2 doz \$1.70¢30¢
Wood, No. 2.....1/2 doz \$3.00, 35¢
Dean's, No. 1, 1/2 doz \$6.50; 2, \$3.35; 3, \$1.00; Queen, \$2.50
Dunlap's Improved.....1/2 doz \$7.75, 20¢
Hotchkiss Straight Flash.....1/2 doz \$12.00
Jennings' Star.....1/2 doz \$2.50
King.....40¢5¢
Little Giant.....50¢50¢25¢
Sammis, No. 1, \$5.00; No. 2, \$9.12; \$18 1/2 doz.....25¢10¢
The Boss.....1/2 doz \$2.50

Standard Fiber Ware—
See Fire, Standard Fiber.

Staples—
Barbed Blind, 1/4 in. and larger, 1/2 doz 77¢
Barbed Blind, 1/4 in. Same price
Fence Staples, Galvanized, 1/2 as B'r Wire
Fence Staples, Plain.....1/2 as B'r Wire
Grand Crossing Tack Co.'s list.....75¢10¢

Steels Butchers—
O. & A. Hoffmann's.....40¢
Nichols Bros.....50¢

Steelyards—
40¢10¢50¢

Stocks and Dies—
Blacksmith's Goods.....85¢
Butterfield's Goods.....85¢
Waterford Goods.....85¢
Gardner.....25¢
Green River.....25¢
Lightning Screw Plate.....25¢50¢
Reese's New Screw Plates.....25¢50¢
Reversible Ratchet.....30¢

Stone, Grind—See Grindstones.
Scythe Stones—
Pike Mfg. Co., list April 1892.....85¢45¢
Cleveland Stone Co., list Nov 1892.....85¢45¢

Oil Stones, &c.—
Hindustan No. 1, 1/2 doz.....5¢
Sand Stone.....40¢40¢
Turkey Oil Stone, 1/2 to 8.....10¢
In.....80¢
Turkey Slips.....\$2.00
Lily White Washita.....80¢
Rosy Red Washita.....80¢
Washita Stone, Extra.....50¢
Washita Stone, No. 1.....40¢
Washita Stone, No. 2.....30¢
Lily White Slips.....90¢
Rosy Red Slips.....90¢
Washita Slips, Extra.....80¢
Washita Slips, No. 1.....70¢
Arkansas Stone, No. 1, 3 to 5 in, \$2.80
Arkansas Stone, No. 15, 1/2 to 8 in, \$3.50
Lake Superior.....1/2 doz \$13¢
Lake Superior Slips.....1/2 doz \$20¢
Tanite Mills:
Emery Oil.....1/2 doz, \$9.00, 50¢65¢

Stops, Bench—
Cincinnati.....25¢10¢
Crescent.....1/2 doz \$1.50
Crescent.....1/2 doz \$5, 10¢10¢10¢
McGills 1/2 doz \$3.....25¢
Millers Falls.....25¢
Morrell's, 1/2 doz, No. 1, \$10.00; No. 2, \$11.00.....40¢20¢
Stearns.....30¢10¢
Taper Nos. 1 and 2, 1/2 doz, \$3; No. 3, \$5.50.....30¢
Weston's, No. 1, 1/2 doz, \$2.25; No. 2, \$2.25; No. 3, \$2.25.....40¢10¢

Stove Polish—
See Polish, Stove.

Stretchers Carpet—
Cast Iron, Steel Points.....1/2 doz 75¢80¢
Cast Steel, Polished.....1/2 doz \$2.25
Socket.....1/2 doz \$1.75
Bullard's.....25¢10¢40¢

Strops Razor—
Badger Belt and Co.....1/2 doz \$2.00
Campbell Cutlery Co.....Net prices
Electric Cutlery Co.....Net prices
Genuine Emerson.....40¢60¢5¢
Imitation.....1/2 doz \$2.00, 20¢10¢5¢
Jordan's Pat. Padded, list Nov. 1, '89, 50¢
Lamont Combination.....1/2 doz \$4.00
Net prices

Stuffer Sausage—
Miles' Challenge, 1/2 doz \$20.....50¢50¢5¢
Perry, 1/2 doz, No. 1, \$15.00; No. 0, \$21.00.....50¢5¢50¢10¢
Draw Cut No. 4, each \$30.00.....20¢
Enterprise Mfg. Co., list Jan 17, '93, 25¢
Silver's.....40¢10¢

Sweepers, Carpet and Lawn Carpet—
Acme.....1/2 doz \$26.00
Advance.....1/2 doz \$18.00
Banner Jap'd, 1/2 doz, \$22.00; Nickel, \$24.00
Grand.....1/2 doz \$36.00
Gold Medal.....1/2 doz \$27.00
Prize.....1/2 doz \$27.00
Superior.....1/2 doz \$27.00
Cosmopolitan.....1/2 doz \$24.00
Furniture Protector, Jap.....1/2 doz \$8.00
Furniture Protector, Nickel.....1/2 doz \$27.00
Inter Ocean.....1/2 doz \$48.00
Hall.....1/2 doz \$19.00; 1/2 doz, \$5.00
Domestic, No. 2.....1/2 doz \$21.00
Domestic, No. 2.....1/2 doz \$21.00
Easy, Jap'd, 1/2 doz, \$22.00; Nickel, \$24.00
Excelsior.....1/2 doz \$22.00
Garland.....1/2 doz \$18.00
Hilt Edge.....1/2 doz \$24.00
Grand.....1/2 doz \$24.00
Grand Republic.....1/2 doz \$33.00
Housewife's Delight.....1/2 doz \$15.00
Imperial.....1/2 doz \$26.00
Improved Parlor Queen, Japanned.....1/2 doz \$24.00
Nickel.....1/2 doz \$27.00
Ladies' Friend.....1/2 doz \$15.00
Ladies' Friend No. 2.....1/2 doz \$18.00
Model.....1/2 doz \$27.00
Parlor Queen.....1/2 doz \$24.00
Our Leader.....1/2 doz \$19.00
Our Own.....1/2 doz \$27.00
Easy, Jap'd, 1/2 doz, \$22.00; Nickel, \$24.00
Reliable.....1/2 doz \$22.00
Select.....1/2 doz \$24.00
Standard.....1/2 doz \$24.00
Supreme.....1/2 doz \$22.00
The Star.....1/2 doz \$21.00
Triumph.....1/2 doz \$20.00
Eggshell Carpet Sweepers Co. make the following rebates:
\$1.00 per doz. in 5 doz. lots.
\$2.00 per doz. in 10 doz. lots.

Lawn—
Thompson Mfg. Co.....30¢

Swings—
Davies Lawn.....25¢

Tacks, Brads &c.—
List October 19, 1889. Old established straight weights. Short weight goods are sold at lower prices.

Carpet Tacks—
American, Blued.....47¢45¢
American, Tin'd and Cop'd.....52¢45¢
Steel, Bright and Blued.....52¢45¢
Steel, Tinned and Coppered.....52¢45¢
Swedes Iron, S. S., Blued.....40¢
Swedes Iron, S. S., Tinned.....47¢45¢
American Iron Tacks, Domestic 37¢45¢
American Iron Tacks, Foreign.....50¢
Swedes Iron Tacks—
S. S., Blued.....37¢45¢
S. S., Tinned.....45¢
Lanc., Blued.....30¢
Lanc., Tinned.....37¢45¢
Upholsterers' S. S.....47¢45¢
Upholsterers' Lanc.....37¢45¢
Gimp Tacks—
S. S., Blued.....30¢
S. S., Tinned.....42¢45¢
Lanc., Blued.....20¢
Lanc., Tinned.....35¢
Basket and Trimmers' Tacks—
Lanc.....20¢
S. S.....30¢
Russell's Cells.....35¢
Common and Patent Brads.....35¢
Leathered Tacks.....20¢
Brush Tacks and Nails, S. S.....20¢
Looking Glass Tacks, S. S.....5¢
Picture-Frame Points, S. S.....12¢45¢
Lace Tacks Blued.....12¢45¢
Lace Tacks Tinned.....20¢
Finishing Nails.....62¢45¢
Trunk and Clout Nails—
Black.....52¢45¢
Tinned or Coppered.....57¢45¢
Basket Nails.....37¢45¢
Chair Nails.....35¢
Cigar Box Nails.....80¢
Tin Capped Nails.....50¢

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Wire—
See Wire, Standard Fiber.

Miscellaneous—
Double Point.....90¢10¢90¢10¢10¢
Wire Carpet Nails.....60¢10¢60¢10¢10¢
Bill Nye Brad Box.....40¢
Bonnie Blue.....1/2 box \$1.50
Claw Handle Carpet.....1/2 gross \$4.00
Home Tacks, No. 50 1/2 case (12 cartons) \$36.00; No. 100, 1/2 case (12 cartons) \$72.00.
Home Nails, No. 200, 1/2 case (12 cartons) \$30.00; No. 400, 1/2 case (12 cartons) \$60.00.
Parian Gilt Nails, cartoon.....50¢
Plymouth Rock Carpet Tacks.....20¢
Upholsterers' Nails.....50¢10¢

Wire Brads and Nails—
Steel-Wire Brads, R. & E. Mfg. Co.'s list.....50¢10¢10¢
See also Nails, Wire.

Tanks Oil—
Emerald, S. S. & Co.: 30-gal. \$3.75; 60-gal., \$11 each.....50¢10¢5¢

Tapes, Measuring—
American.....40¢10¢50¢
Chesterman's, Regular list.....25¢30¢
Excelsior, Special list.....20¢
Spring.....40¢

Thermometers—
Tin Case.....80¢80¢10¢

Thimble Skeins—See Skeins.
Ties Bale—Steel.
Standard Wire, list.....50¢10¢5¢

Tinners' Shears, &c.—
See Shears, Tinners' &c.

Tinware—
Stamped, Japanned and Plead, list Jan 20, 1887.....70¢10¢70¢25¢

Tire Benders, Upsetters, &c.—See Benders and Upsetters' Tools.

Tobacco Cutters—
See Cutters, Tobacco.

Tools—Coopers—
Albertson Mfg. Co.....25¢
Barton's.....30¢20¢5¢
Beatty's.....39¢45¢
Bradley's.....20¢
Sandusky Tool Co.....30¢30¢5¢
Shaves Cincinnati Tool Co.....20¢
L. & I. J. White.....20¢5¢

Lumber—
Cant Hooks, "Blue Line".....1/2 doz \$16.00
Cant Hooks, Common Finish.....1/2 doz \$14.00
Cant Hooks, Mail, Socket Clasp, "Blue Line" Finish.....1/2 doz \$16.50
Cant Hooks, Mail, Socket Clasp, Common Finish.....1/2 doz \$14.50
Cant Hooks, Clip Clasp, "Blue Line" Finish.....1/2 doz \$14.00
Cant Hooks, Clip Clasp, Common Finish.....1/2 doz \$12.00
Hand Spikes.....1/2 doz 6 ft., \$15.00; 8 ft., \$20.00
Pike Poles, Pike & Hook, 1/2 doz, 12 ft., \$11.50; 14 ft., \$12.50; 16 ft., \$14.50; 18 ft., \$17.50; 20 ft., \$21.50.
Pike Poles, Pike only, 1/2 doz, 12 ft., \$10.00; 14 ft., \$11.00; 16 ft., \$13.00; 18 ft., \$15.00; 20 ft., \$20.00.
Pike Poles, not ironed, 1/2 doz, 12 ft., \$10.00; 14 ft., \$11.00; 16 ft., \$13.00; 18 ft., \$15.00; 20 ft., \$20.00.
Pike Poles, 1/2 doz, 12 ft., \$14.00; 14 ft., \$15.00; 16 ft., \$17.00.
Swamp Hooks.....1/2 doz \$18.00

Saw—
Atkins', new list.....40¢
Simonds'.....33¢45¢

Transom Lifters—
See Lifters, Transom.

Traps—Game—
Blake's Patent.....40¢10¢50¢
Newhouse.....40¢10¢50¢5¢
Onella Pattern.....75¢75¢10¢5¢
Sensible.....33¢45¢

Mouse and Rat—
Cyclone.....1/2 gr \$5.25
Dandy.....1/2 gr \$1.75
Hotchkiss Metallic Mouse, 5-hole trap.....1/2 doz, 75¢; in full cases, 1/2 doz \$6.00; 5¢
Hotchkiss Imp. Rat Killer.....1/2 gr \$18.50
Hotchkiss New Rat Killer.....1/2 gr \$16.50
Ideal.....1/2 gr \$10.00
Mouse, Roman.....1/2 doz 0.90¢41.00
Mouse, Case, Wire.....1/2 doz \$2.50 10¢
Mouse, Catch-em-alive.....1/2 doz \$2.50 15¢
Mouse Wood, Choker, 1/2 doz holes, 9¢10¢
Mouse, Round Wire.....1/2 doz \$1.50 10¢
Mouse, Sensible.....33¢45¢
Rat, Decoy.....1/2 gr \$10.00, 10¢
Rat, Sensible.....33¢45¢
Schuyler's Rat Killer.....1/2 gr \$16.00
Waddell's Go Bang, 1/2 gr.....1/2 doz \$12.50

Fly—
Balloon, Globe or Acone.....1/2 doz \$1.50, 1/2 gr \$18.50
Harper, Champion or Paragon.....1/2 doz \$1.75, 1/2 gr \$16.50

Triers—
Butter and Cheese.....25¢

Trimmers, Spoke—
Bonney's.....1/2 doz \$10.00, 50¢
Ives', No. 1, \$15.00; No. 2, \$12.00, 1/2 doz.....55¢10¢
Stearns'.....20¢10¢
Douglas'.....1/2 doz \$9.00, 20¢
Cincinnati.....25¢

Traps—
Brade's Brick.....25¢25¢5¢
Clement & Maynard's.....20¢20¢5¢
Diston's Br'k and Plastering.....25¢25¢10¢
Lethrop's Brick and Plastering.....20¢10¢5¢35¢

Peace's Plastering.....25¢25¢5¢
Reese's Brick and Plastering.....25¢25¢5¢
Worrall's Brick and Plastering.....25¢25¢5¢
Cleaves' Angle Trowel, 1/2 gr, No. 1, \$36; No. 2, \$30; No. 3, \$15. net 10¢
Garden.....70¢

Trucks, Warehouse, &c.—
B. & L. Block Co.'s list.....40¢
Eames' Barrel Trucks.....40¢
Daisy Stove Trucks, Improved pattern, 1/2 doz \$18.00
Thompson Mfg. Co.....40¢
See Pipe

Twine—
Flax Twine—
No. 9, 1/4 and 1/2 Bails.....22¢ 29¢
No. 12, 1/4 and 1/2 Bails.....18¢ 24¢
No. 18, 1/4 and 1/2 Bails.....17¢ 20¢
No. 24, 1/4 and 1/2 Bails.....17¢ 20¢
No. 36, 1/4 and 1/2 Bails.....16¢ 19¢
Chalk Line, Cotton, 1/2 Bails.....17¢
Cotton Mow, 6.9, 12.2, 15 B to doz, 15¢17¢
Cotton Wrapping, 5 Bails to B.....18¢14¢
2-Ply Hemp, 1/4 and 1/2 Bails (Spring Twine).....10¢10¢10¢
3-Ply Hemp, 1/2 Bails.....10¢10¢10¢
3-Ply Hemp, 1/4 Bails.....10¢10¢10¢
2, 3, 4 and 5 Ply Jute, 1/2 Bails.....8¢
Mason Line, Linen, 1/2 Bails.....5¢
No. 24 Mattress, 1/4 and 1/2 Bails, 52¢54¢
Paper.....10¢11¢
Wool.....5¢6¢6¢

Vises—
Solid Box.....50¢10¢60¢

Parallel—
Backus and Union.....40¢
Bonney's.....40¢
Double Screw Leg.....15¢10¢
Fisher & Norris Double Screw.....15¢10¢
Hollands'.....35¢40¢
Howard's.....40¢
Massey Quick Action.....20¢25¢
Merrill's.....15¢20¢
Millers' Falls.....40¢40¢10¢
Moore's.....20¢
Parker's.....20¢25¢
Prentiss'.....20¢25¢
Sargent's.....70¢10¢
Simpson's Adjustable.....25¢30¢
Stephens'.....40¢50¢40¢10¢
Trenton.....40¢50¢40¢10¢
Wilson's.....55¢

Saw Filers—
Bonney's, Nos. 2 & 3, \$15.00.....40¢10¢50¢
Economy, 1/2 doz, Nos. 110, \$10.00; 120, \$15.00.....50¢10¢50¢
Hopkins'.....1/2 doz \$17.10
Reading.....40¢10¢
Stearns' Common, Nos. 0, 1, 2 & 3.....50¢
Stearns' Rubber Jaw, Nos. 10 & 33, 33¢45¢
Wentworth.....20¢10¢

Miscellaneous—
Bauer's Pipe Vises.....10¢
Cincinnati.....25¢10¢
Cowell Hand Vises.....25¢10¢
Enterprise Pipe Vises, each \$3.00, 40¢
Massey Combination Pipe Vise.....40¢
Phoenix Vises.....39¢45¢
Phoenix Hand Vises, 1/2 doz \$3.60, 39¢45¢

Wads—Price Per M.
U.M.C. & W.R.A.—B. E., 11 up.....68¢
U.M.C. & W.R.A.—B. E., 9¢10.....82¢
U.M.C. & W.R.A.—B. E., 8.....96¢
U.M.C. & W.R.A.—B. E., 7.....1.10
U.M.C. & W.R.A.—P. E., 11 up.....1.15
U.M.C. & W.R.A.—P. E., 9¢10.....1.60
U.M.C. & W.R.A.—P. E., 8.....1.70
U.M.C. & W.R.A.—P. E., 7.....1.80
Eley's B. E., 11 and larger.....\$1.70¢1.75
Eley's P. E., 12 to 20.....\$3.00¢\$3.35

Wagon Boxes—
See Boxes, Wagon.

Wagon Jacks—
See Jacks, Wagon.

Ware, Hollow—
Cast Iron, Hollow—
Stove Hollow-Ware—
Ground.....60¢10¢60¢10¢10¢
Unground.....65¢10¢70¢5¢
Gray Enameled Ware—
Stove.....50¢50¢5¢
Maslin Kettles.....60¢10¢60¢10¢10¢
Boilers and Saucepans.....40¢5¢40¢10¢
White Enameled Ware—
Maslin Kettles.....70¢10¢75¢5¢
Boilers and Saucepans.....60¢60¢10¢
Rustless Hollow Ware.....60¢60¢10¢
Tinned Boilers and S'pans.....60¢60¢10¢

Enameled—
Agate and Granite Ware, list Jan. 1, 1894.....25¢
Ironclad Enameled Ware, Old list.....50¢10¢

Kettles—
Galvanized Tea-Kettles—
Inch.....6 7 8 9
Each.....55¢ 60¢ 65¢ 75¢
Steel Hollow Ware—
Avery Spiders and Griddles.....60¢70¢
Avery Kettles.....60¢10¢10¢70¢10¢

Standard Fiber—
Per Doz.
Plain, Decorated.....\$7.50
Cuspidors.....\$3.00
Half-peck Measure.....\$3.00
Peck Measure.....\$3.00
Keelers, 1 1/4 in.....3.00
Spittoons, "Daisy", 8 in. 3.00
Wash-Basins, 10 in.....1.80
Wash-Basins, 12 in.....2.00
See also Falls.

Indurated Fiber—
Basins, Ringed, 1/2 doz, No. 2.....2.80
Butter Bowls 15, 17 and 19-inch (3 pieces), 1/2 nest.....\$1.50
Keelers Nested, Nos. 1, 2, 3 and 4 (4 pieces), 1/2 nest.....\$2.55
Liquid Measures, 1/2 qt, 2 qt, and 4 qt (funnel) (4 pieces), 1/2 set.....\$1.20
Spittoons No. 2, 1/2 doz.....\$8.00
Washbuds, Nested, Nos. 0, 1, 2, and 3 (4 pieces), 1/2 nest.....\$5.75
See also Falls.

Silver Plated, Hollow—
1 mo. or 5 c cash in 30 days.
Meriden Britannia Co.....40¢
Reed & Barton.....40¢
Rogers & Brother.....40¢
Simpson, Hall, Miller & Co.....40¢
Hartford Silver Plate Co.....40¢55¢
William Rogers Mfg. Co.....40¢55¢

Washers—
size hole.....5-16 3/4 1/2 5/8 3/4 1 1/2
Washers.....4 1/2 5 5 1/2 6 3/4 8 1 1/2
In lots less than 2000, P.

Whips

American Whip Co.	Length.	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8 ft
X. L. Whalshone Driving	\$18.00	20.00	22.00	24.00	27.00	30.00	33.00	36.00
Eureka, Two-thirds Whalshone	15.00	16.50	18.00	20.00	22.00	24.00	26.00	28.00
Bull Bone, Half-length Whale bone	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00
American Standard	8.00	8.50	9.00	9.50	10.00	10.50	11.00	11.50
True Grip, Raw Hide Center	6.00	6.00	6.50	7.00	7.50	8.00	8.50	9.00
New Name, Stocked Java, Black and Wine Colors	6.00	6.00	6.50	7.00	7.50	8.00	8.50	9.00
Americus, 98 Pen Whip	6.00	6.00	6.50	7.00	7.50	8.00	8.50	9.00
Gents' Light Driving No. 111	6.00	6.00	6.50	7.00	7.50	8.00	8.50	9.00
Gents' Light Driving No. 106	6.00	6.00	6.50	7.00	7.50	8.00	8.50	9.00
Hand-made Stocked Java No. 108	3.75	4.00	4.25	4.50	4.75	5.00	5.25	5.50
A large variety of cheaper grades	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75
Team Whips	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75
Toy Whips	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75
Hardware Assortments, 10 American, 75 Whips for \$50.00	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75

Wire and Wire Goods—**Iron—**

Market,

Br. & Ann, Nos. 0 to 18	Extra 5 to 10% often given and low net prices often made on large lots.
75¢ to 10¢ 75¢ to 10¢	
Cop'd, Nos. 0 to 18, 75¢ to 10¢	
Galv., Nos. 0 to 18, 75¢ to 10¢	
Tin'd, Tin'd list, Nos. 0 to 18, 75¢ to 10¢	

Stone,

Br. and Ann'd, Nos. 10 to 18, 80¢ to 10¢	Extra 10% often given.
Nos. 19 to 28, 82¢ to 10¢	
Nos. 27 to 38, 82¢ to 10¢	
Annueled Wire on Spools, Brass, list Jan. 18, 1884, 40¢ to 50¢	
Cast Steel Wire, Nos. 10 to 18, 1884, 40¢ to 50¢	
Copper, list Jan. 18, 1884, 40¢ to 50¢	
Galvanized Fence, Nos. 10 to 18, 75¢ to 10¢	
Malin's Anale & Tin'd on Spools, 60¢ to 75¢	
Malin's Brass and Cop. on Spools, 50¢ to 65¢	

Per dozen.

Steel Music Wire, 12 to 30, Imported	60¢ to 70¢
Stubs' Steel Wire	80¢ to 100¢
Tate's Spooled, Tin'd & Annealed	60¢ to 70¢
Tate's Spooled Cop. and Brass	50¢ to 60¢
Tinned Broom Wire, 18 to 21, 1/2 B. 45¢	
Wire Clothes Line, see Lines	
Wire Picture Cord, see Cord	
Bright Wire Goods—	
Standard list	90¢ to 100¢
Wire Cloth and Netting—	
Galvanized Wire Netting	80¢ to 100¢
Painted Screen Cloth 100 ft 1 1/2¢ to 1 1/2¢	

Wire Barb—

See Trade Report.

Wire Rope—See Rope, Wire.**Wrenches—**

American Adjustable	40¢ to 50¢
Baxter's Adjustable "S"	40¢ to 50¢
Baxter's Diagonal	50¢ to 60¢
Coe's Genuine	50¢ to 60¢
Coe's "Mechanics"	50¢ to 60¢
Girard Standard	50¢ to 60¢
Lamson & Sessions' Engineers'	60¢ to 70¢
Lamson & Sessions' Standard	70¢ to 80¢
Girard Agricultural	75¢ to 100¢
Lamson & Sessions' Agri'l.	80¢ to 100¢
P. S. & W. Agricultural	80¢ to 100¢
W. & B. Diamond	50¢ to 60¢
Acme, Bright	40¢ to 50¢
Acme, Nickeled	40¢ to 50¢

Alken's Pocket (Bright)	\$5.00, 50¢ to 100¢
Alligator	50¢ to 100¢
Always Ready	50¢ to 100¢
Bentley & Callis	50¢ to 100¢
Adjustable S	35¢ to 50¢
Brigg's Pattern	80¢ to 100¢
Combination Black	40¢ to 50¢
Combination Bright	40¢ to 50¢
Cylinder or Gas Pipe	45¢ to 50¢
Extra Heavy	45¢ to 50¢
Herrick's Pattern	45¢ to 50¢
No. 3 Pipe Bright	55¢ to 60¢
Bit Wrench, Adj., Tatum's	25¢ to 30¢
Boardman's	25¢ to 30¢
Cincinnati Brace Wrenches	25¢ to 30¢
Diamond Steel	20¢ to 30¢
Donohue's Engineer	50¢ to 100¢
Eagle	70¢ to 100¢
Hercules	70¢ to 100¢
Taft's Vice Wrench	55¢ to 100¢
The Favorite Pocket	40¢ to 50¢
Walker's	55¢ to 60¢
Webster's Pat. Combination	55¢ to 60¢

Wringers, Clothes

Am. Wringer Co.'s list, July 1, 1893	25¢ cash
Colby Wringer Co.'s list, May 1, 1893	25¢ cash
Correll Mfg. Co.'s list, July 1, 1893	25¢ cash
Pearless Mfg. Co.'s list, Feb. 1, 1893	25¢ cash
National Wringer & Mfg. Co.'s list, June 1, 1893	25¢ cash
Wrought Goods—	
Staples, Hooks, &c., list, March 17, 1893	85¢ to 100¢

Paints, Oils and Colors.—Wholesale Prices.

Animal and Vegetable Oils—

Linseed, City, raw, per gal.	54 @ 55
Linseed, City, boiled	57 @ 58
Linseed, Western, raw	53 @ 54
Lard, City, Extra Winter	55 @ 56
Lard, City, Prime	53 @ 54
Lard, City, No. 1	48 @ 49
Lard, Western, prime	52 @ 53
Cotton-seed, Crude, prime	20 @ 21
Cotton-seed, Crude, off grades	26 @ 28
Cotton-seed, Summer Yellow, prime	20 @ 21
Cotton-seed, Summer Yellow, off grades	30 @ 32
Sperm, Crude	60 @ 62
Sperm, Natural Spring	60 @ 62
Sperm, Bleached Spring	65 @ 67
Sperm, Natural Winter	65 @ 67
Sperm, Bleached Winter	70 @ 72
Whale, Crude	40 @ 42
Whale, Natural Winter	40 @ 42
Whale, Bleached Winter	45 @ 47
Whale, Extra Bleached	47 @ 49
Sea Elephant, Bleached	40 @ 42
Winter	20 @ 22
Menhaden, Crude, Sound	25 @ 27
Menhaden, Crude, Southern	25 @ 27
Menhaden, Light Pressed	30 @ 31
Menhaden, Bleached Water	35 @ 37
Menhaden, Extra Bleached	37 @ 39
Tallow, City, prime	43 @ 45
Tallow, Western, prime	40 @ 42
Cocconut, Ceylon	54¢ @ 55¢
Cocconut, Cochim	74¢ @ 75¢
Cod, Domestic	34 @ 35
Cod, Foreign	36 @ 37
Red Elaine	35 @ 36
Red Saponified	44¢ @ 45¢
Bank	28 @ 29
Straits	29 @ 30
Olive, Italian, bbls.	56 @ 58
Neatsfoot, prime	60 @ 62
Palm, prime, Lagos	54¢ @ 55¢

Mineral Oils—

Black, 29 gravity, 25 @ 30 cold test	7 @ 7 1/2
Black, 29 gravity, 15 cold test	7 @ 8
Black, 29 gravity, summer	5 1/2 @ 6 1/2

Cylinder Lubr, filtered	12 @ 16
Cylinder, dark, filtered	10 @ 13
Paraffine, 23 1/2 @ 24 gravity	11 @ 12
Paraffine, 25 gravity	10 @ 11
Paraffine, 28 gravity	7 1/2 @ 8
Paraffine, red	10 1/2 @ 10 3/4

Paints and Colors—

Barytes, Foreign, 10 ton	\$22.00 @ 24.00
Barytes, Amer. loaded	29.00 @ 32.00
Barytes, Amer. No. 1	16.00 @ 18.00
Barytes, Amer. No. 2	13.00 @ 15.00
Barytes, Amer. No. 3	11.00 @ 12.00
Blue, Celestial	8 @ 8
Blue, Chinese	40 @ 50
Blue, Prussian	25 @ 40
Blue, Ultramarine	8 @ 25
Brown, Spanish	1 1/2 @ 1
Brown, Vandyke, Amer.	3 @ 3 1/2
Brown, Vandyke, English	6 @ 8
Carmine, No. 40, in bulk	2.00 @
Carmine, No. 40, in boxes or barrels	2.10 @
Carmine, No. 40, in ounce bottles	3.00 @
Chalk, in bulk	1.75 @ 2.00
Chalk, in bbls	100 @ 35
China Clay, English	10 @ 11
Cobalt Oxide, prep'd	9.00 @ 11.00
Cobalt Oxide, black	lots 100 lb. 1.80 @
Cobalt Oxide, black	lots 100 lb. 1.80 @
Green, Paris, in bulk	1.00 @ 2.3
Green, Paris, 170 @ 175 lb	25 @ 23 1/2
Green, Paris, small pack	25 @ 23 1/2
Rebates, 3¢ @ 10 on lots of 10,000 lb or over; 2¢ @ 10 on 1000 to 10,000 lb; 2¢ @ 10 on 2000 to 1000 lb; 1¢ @ 10 on 1000 to 200 lb; 1¢ @ 10 on 500 to 1000 lb purchased during the season.	
Green, Chrome, ordinary	6 @ 12
Green, Chrome, pure	22 @ 25
Lead, Eng., B.B. white	7 @ 8
Lead, Amn. White	4 1/2 @ 4 3/4
Dry	5 1/2 @ 6 1/2
In Oil	5 1/2 @ 6 1/2
Lead, White, in oil, 25 lb tin pails, add to keg price	.. @ 1 1/2
Lead, White, in oil, 12 1/2 lb tin pails, add to keg price	.. @ 1
Lead, White, in oil, 3 to 5 lb assorted tins, add to keg price	.. @ 2 1/2

Lead, Red, bbls. and 1/2 bbls.	5 1/2 @ 5 1/2
Lead, Red, kegs	5 1/2 @ 6
Litharge, kegs	5 1/2 @ 6 1/2
Litharge, bbls. and 1/2 bbls	5 1/2 @ 6
Ocher, Rochelle	1.35 @ 1 1/2
Ocher, French Washed	1 1/2 @ 2 1/2
Ocher, German Washed	1 1/2 @ 3
Ocher, American	1 1/2 @ 1 1/2
Orange Mineral, English	7 1/2 @ 8
Orange Mineral, French	10 @ 10 1/2
Orange Mineral, German	7 1/2 @ 8
Orange Mineral, American	7 1/2 @ 8
Red, Indian, English	5 @ 15
Red, Indian, American	2 @ 5
Red, Turkey	9 @ 14
Red, Tuscan	7 @ 10
Red, Venetian, American	100 lb. .70 @ 1.00
Red, Venetian, English	1.10 @ 1.35
Sienna, Italian, Burnt and Powdered	4 @ 5
Sienna, Ital., Burnt Lumps	1 1/2 @ 3 1/2
Sienna, Ital., Raw, Powd.	4 1/2 @ 5 1/2
Sienna, Ital., Raw, Lumps	1 1/2 @ 3 1/2
Sienna, American, Raw	1 1/2 @ 3 1/2
Sienna, American, Burnt and Powdered	1 1/2 @ 1 1/2
Talc, French	1 1/2 @ 1 1/2
Talc, American	1 @ 1 1/2
Terra Alba, French	65 @ 75
Terra Alba, English	65 @ 75
Terra Alba, American No. 1	45 @ 75
Terra Alba, American No. 2	45 @ 60
Umber, Turkey, Burnt and Powdered	2 1/2 @ 3 1/2
Umber, Turkey, Raw and Powdered	2 1/2 @ 3 1/2
Umber, Turkey, Raw Lumps	2 1/2 @ 3 1/2
Umber, Turkey, Bnt. Amer.	1 1/2 @ 2 1/2
Umber, Turkey, Raw Amer.	1 1/2 @ 2 1/2
Yellow, Chrome	10 @ 25
Vermilion, American Lead	11 @ 12
Vermilion, Quicks'er, bulk	43 @
Vermilion, Quicks'er, bags	44 @
Vermilion, Quicksilver sm'r	52 @
Vermilion, English Import	55 @ 60
Vermilion, Imitation, Eng.	8 @ 30
Vermilion, Trieste	90 @ 95
Vermilion, Chinese	85 @ 100
Whiting Common, 100 lb	40 @ 45
Whiting Gliders	60 @ 65
Zinc, American	3 1/2 @ 4 1/2
Zinc, French, Red Seal	7 @ 7 1/2

Zinc, French, Green Seal	8 1/2 @ 9
Zinc, French, V. M. X.	6 @ 7
Zinc, Antwerp, Red Seal	6 @ 6 1/2
Zinc, Antwerp, Green Seal	6 1/2 @ 7 1/2
Zinc, German, L. Z. O.	5 @ 6
Zinc, V. M. in Poppy Oil, G. Seal, lots of 1 ton and over	10 1/2 @
lots less than one ton	11 @
Zinc, V. M. in Poppy Oil, Red Seal	9 @
lots of 1 ton and over	10 1/2 @
lots less than 1 ton	10 1/2 @
Discounts.—French Zinc.—Discounts to buyers of 10 bbl. lots of one or assorted grades, 1 1/2; 25 bbls, 2 1/2; 50 bbls, 4 1/2. No discount allowed on less than bbl. lots.	

Colors in Oil—

Black, Drop, Frankfurt	25 @ 30
Black, Drop, English	12 @ 16
Black, Drop, Domes	7 @ 10
Black, Lampblack, Best	20 @ 35
Black, Lampblack, Common	7 @ 13
Black, Ivory	8 @ 15
Blue, Chinese	35 @ 40
Blue, Prussian	20 @ 45
Blue, Ultramarine	12 @ 18
Brown, Vandyke	7 @ 12
Green, Chrome	8 @ 13
Green, Paris	16 @ 18 1/2
Sienna, Raw	7 @ 14
Sienna, Burnt	7 @ 14
Umber, Raw	7 @ 10
Umber, Burnt	7 @ 10

Putty—

In barrels and 1/2 bbls.	.013¢ @ .013 1/2
In tubs	.015¢ @ .015 1/2
In tin cans	.015¢ @ .015 1/2
In bladders	.017¢ @ .017 1/2

Spirits Turpentine

In regular bbls.	30¢ @
In machine bbls.	31¢ @ 31 1/2

Glue—

Low Grade	7 @ 9
Cabinet	11 @ 14
Medium White	12 @ 14
Extra White	16 @ 20
French	10 @ 22
English	10 @ 25
Irish	10 @ 12 1/2

THE IRON AGE.

The oldest paper in the world devoted to the interests of the Hardware, Iron and Metal Trades, and a standard authority on all matters relating to those branches of industry.

RATES OF SUBSCRIPTION: INCLUDING POSTAGE.**UNITED STATES AND BRITISH AMERICA.**

Weekly Edition, Issued every THURSDAY MORNING	\$4.50 a year.
Semi-Monthly Edition, FIRST and THIRD THURSDAYS of every month	2.30 "
Monthly Edition FIRST THURSDAY of every month	1.15 "

ALL OTHER COUNTRIES.

Per Annum, Postpaid.

Weekly Edition: \$5.00=£1=25 francs=20 marks=11 florins=6 roubles (coin)=25 lire=20 pesetas.	
Semi-Monthly Edition: \$2.50=£10=12 1/2 francs=10 marks=6 florins=3 roubles (coin)=12 1/2 lire=10 pesetas.	
Monthly Edition: \$1.25=£5=6 1/4 francs=5 marks=3 florins=1 1/2 roubles (coin)=6 1/4 lire=5 pesetas.	

RATES OF ADVERTISING: ONE SQUARE (12 LINES, ONE INCH).

ONE INSERTION	\$2.00	SIX MONTHS	\$30.00
ONE MONTH	7.50	ONE YEAR	50.00
THREE MONTHS	17.50		
New York (Main Office), 96-102 Reade Street,		DAVID WILLIAMS, Publisher	
Philadelphia, 220 South Fourth Street,		THOMAS HOBSON, Manager.	
Pittsburgh, Room 509, Hamilton Building.		ROBERT A. WALKER, Manager.	
Chicago, 59 Dearborn Street, cor. Randolph,		J. K. HANES, Business Manager	
Cincinnati, Rooms 22-24 Pickering Building,		GEO. W. COPE, Resident Asso. Ed	
St. Louis, Bank of Commerce Building,		HENRY SMITH, Manager.	
Boston, 146 Franklin Street,		H. H. ROBERTS, Manager.	
Cleveland, 312 The Cuyahoga,		WALTER C. ENGLISH, Manager.	
		EZRA S. ADAMS, Manager.	

BRITISH AGENCY: Office of The Ironmonger, 42 Cannon St., London.

AUSTRALIAN OFFICES: Melbourne, 231 Elizabeth St.; Sydney, 3 Wynyard St.

Remittances should be made by draft, payable to the order of DAVID WILLIAMS, on any banking house in the United States or Europe, or by P. O. Money Order on New York. When these cannot be obtained, postage stamps of any country will be received.

Newsdealers or Booksellers in any part of the world may obtain The Iron Age through The American News Company, New York, U. S. A. The International News Company, New York, U. S. A., and London, England; or The San Francisco News Company, San Francisco, Cal., U. S. A.

Entered at the Post Office, New York as Second-Class Matter.

JULY 11, 1894.

Hosted by Google

This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

GoogleTM books

<https://books.google.com>

